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IMPLEMENTATION OF THE FEDERAL WATER POLLUTION CONTROL ACT CONCERNING THE PERFORMANCE OF THE MUNICIPAL WASTEWATER TREATMENT CONSTRUCTION GRANTS PROGRAM

REPORT

BY THE

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

OF THE

COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION HOUSE OF REPRESENTATIVES

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FOREWORD

The construction of wastewater treatment facilities has long been recognized as a necessary and critical component of the national program to clean up raw or partially treated sewage discharges from cities and towns across the country. In this regard, the performance of the Construction Grants Program, authorized by Title II of the Federal Clean Water Act, is something in which the Committee on Public Works and Transportation has had a vital interest for many years. Hearings and other oversight and review work have shown that those involved in the national clean water program, be they government officials, environmentalists, design engineers, contractors, equipment suppliers, treatment plant operators, or others, share the Committee's concerns about the performance of this multi-billion dollar grants program.

During the past several months, the Subcommittee on Investigations and Oversight conducted an extensive examination of this program, and, to make the results of its labors available in the most usable form possible, has prepared this report.

This document will be of great value to this Committee and other Members of Congress, and I am confident it will be of equal value to others involved in carrying out the national clean water program.

JAMES J. HOWARD,
Chairman,
Committee on Public Works and Transportation.

COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
HOUSE OF REPRESENTATIVES,
Washington, D.C., December 15, 1981.

Hon. JAMES J. HOWARD,
Chairman, Committee on Public Works and Transportation, Rayburn House Office Building, Washington, D.C.

DEAR MR. CHAIRMAN: During the first session of the 97th Congress, the Subcommittee on Investigations and Oversight conducted the most extensive investigation ever undertaken into the performance of wastewater treatment facilities constructed with billions of dollars in Federal assistance under the Clean Water Act and prior law. Our objective, in extensive field work and public hearings both in Washington and elsewhere, was to determine the extent to which the massive investment in public funds is producing results in terms of cleanup of municipal wastewater discharges. Furthermore, in light of the fact that previous Subcommittee inquires had raised questions with respect to the program's management, we sought to develop a comprehensive analysis of the manner in which the law's requirements and the policies, practices and procedures governing the construction grants program were influencing those results.

The Subcommittee found that the vast majority of treatment plants do, in fact, work well, and are contributing significantly to the progress that continues to be made towards the clean water law's goal of "fishable-swimmable" water nationwide. Nonetheless, a significant portion of existing facilities, roughly a quarter to a third, experience significant performance problems. In some instances, these stem from classic failures in the system, and in others, public apathy or neglect. In either case, they represent the waste of scarce public dollars, and the abuse of one of this nation's most valuable resources, clean water.

Addressing these problems will require changes in both the law and its administration. Those which can be attributed to the performance of the Environmental Protection Agency are not of recent origin; they have persisted from one administration to the next since 1972. While the Subcommittee has taken issue with certain positions taken by the new EPA leadership, we are encouraged by the agency's attempts to make the program more reasonable in its requirements, practical and workable, a policy thrust coinciding with the overall body of our recommendations. The Subcommittee has recited the facts as it sees them, in the hope that a resulting dialogue will lead to a consensus between the executive and legislative branches with respect to water pollution control policy rather than a repetition of the past pattern of promises versus results.

I am pleased to advise you that all of the Members of the Subcommittee have approved the issuing of this report. Given its length and breadth, individual Members do not necessarily concur with each

and every observation and conclusion. However, the Subcommittee does believe that overall the report can provide important guidance to the Congress, the Environmental Protection Agency and others involved in this program, and the public at large.

I also want to acknowledge the cooperation and assistance extended to the Subcommittee by the EPA Administrator and her staff during the conduct of the Subcommittee's inquiries over the past several months. Similarly, the Subcommittee appreciates the cooperation of the many State and local officials, and those others who took the time to assist us in this review. We are grateful to them as well.

With best wishes, I am

Very truly yours,

ELLIOTT H. LEVITAS,
Chairman,
Subcommittee on Investigations and Oversight.

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I—Introduction

For the past nine years, the nation has been embarked on a massive effort to clean up municipal wastewater discharges, a major source of pollution fouling our rivers, streams, lakes and coastal waters. With federal treatment standards and deadlines, and tens of billions of dollars in federal grants-in-aid provided by amendments to the national clean water law in 1972, the U.S. Environmental Protection Agency, State agencies, and thousands of communities across the country have heightened their efforts to restore the quality of the nation's waters.

While far more slowly than had been hoped when the 1972 Act was passed, this massive federal program to provide grant assistance to communities for the construction of wastewater treatment systems has resulted in substantial progress in abating water pollution from municipal sources. Indeed, in spite of persistent problems, there is considerable evidence of successes to support this program's continuation.

For example, the oil and other chemicals that made the Cuyahoga River in Ohio catch fire have disappeared; salmon, bass, sturgeon and perch once again swim the Willamette River in Oregon; and Atlantic Salmon have returned to the Penobscott River in Maine and the Connecticut River in New England. Fish have returned to parts of the lower Savannah River in Georgia, and the quality of water in Georgia's Chattahoochee River and Louisiana's Pearl River has improved dramatically. Lake Erie, once regarded as the nation's prime example of water pollution, has begun to recover.

While these and many other examples underscore the accomplishments of the national clean water program generally, it cannot be denied that the Construction Grants Program authorized by the 1972 Federal Water Pollution Control Act Amendments, Public Law 92–500, has not been accomplishing all that it could. Reports by the U.S. Environmental Protection Agency, the U.S. General Accounting Office and others over the past several years have indicated that the majority of the facilities being designed and constructed under the current and prior federal aid programs are not performing up to expectations, failing to produce the full environmental return on the federal, State, and local investment, and delaying the attainment of clean water objectives.

However, these studies and reports have consistently failed to examine the program in depth, to determine why these performance problems have persisted for so long. Until now, little has been done to valuate not only the policies and procedures used to manage this multi-billion-dollar program, but the ways in which the law itself interacts with those institutions—federal, State and local governments, the engineering community, indeed, the entire private sector—that all have a role in carrying out this law. Raw statistics on the extent

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to which clean-up standards are not met are simply inadequate as a basis for evaluating the program.

Consequently, in this phase of its oversight of the clean water program, the Subcommittee has focused primarily on the performance of wastewater treatment facilities, and the extent to which the federal law's requirements, and the grants program's policies, practices and procedures, have influenced the results. Essentially the Subcommittee has attempted to determine whether the public is getting its money's worth from its investment in the municipal wastewater treatment grants program, and whether the federal law's approach to municipal pollution abatement is encouraging, or discouraging, the development and use of the most cost-effective, affordable, and reliable municipal wastewater treatment methods.

II—Background

In 1972, when the Congress amended the Federal Water Pollution Control Act, the vast quantities of raw or partially treated sewage discharged by large and small communities were recognized as a principal source of the pollution fouling the nation's waters. They also were widely regarded as being readily susceptible to control if a massive investment of federal funds were made. The Congress acted in that belief. By that Act, Public Law 92–500, and subsequent amendments, it has authorized a total of $39.2 billion for grants to communities for 75 percent of the costs of constructing needed treatment plants and sewage collection systems. To date, $33.2 billion has been appropriated, $31 billion obligated and $22 billion expended, for the planning, design and construction of thousands of publicly owned treatment works.

The 1972 Act also mandated a higher level of treatment than did prior federal law. It required secondary treatment [1] by municipalities as a national minimum standard—and even higher performance where water quality considerations dictate—plus a similar regime for industrial dischargers based on the treatment technologies available to them. These standards are imposed by a system of federal/State permits which each municipal and industrial facility must obtain in order to lawfully discharge wastewater containing any pollutants into the receiving waters. Functioning as the primary enforcement mechanism for the program, the discharge permit prescribes in numerical terms the maximum permissible pollutant strength in treated wastewater and hence the degree of clean-up required.[2]

During the first five years, the Environmental Protection Agency, and State agencies exercising delegated authority, were hard pressed to issue thousands of the permits under the National Pollutant Discharge Elimination System (NPDES) set up by the law, and begin the process of awarding grants for the planning, design, and construction of needed wastewater treatment systems under the

[1] The U.S. Environmental Protection Agency is required by the Act to define secondary treatment. The current definition, which has been modified only slightly in the past several years, requires essentially that treated effluent from a municipal plant have, on a monthly average basis, no more than 30 parts per million of biochemical oxygen demand (BOD) and 30 parts per million of suspended solids (SS), and that 85 percent of the BOD and SS entering the plant be removed, again on a monthly average basis.

[2] The law also set out a series of deadlines by which various levels of clean-up were to be achieved, and required that these be included in the permits as well. Consequently, communities were provided with both schedules of compliance and levels of performance, the violation of either being cause for enforcement action authorized under other provisions of the law.

Construction Grants Program. It soon became obvious that some adjustments were necessary, and in 1977 Congress further modified the law.[3]

The 1977 amendments affected the grants program in three major ways. First, it authorized a delegation of the day-to-day management responsibility for the Construction Grants Program to States ready and willing and, most importantly, able to do the job. The purpose of this "State certification" process, in the words of the House report, was to resolve management problems affecting the program, "speed up construction of wastewater treatment works, hold down costs, and *strengthen the environmental, engineering, and fiscal integrity of the program.*" (Emphasis added.)

Second, the 1977 statute contained a package of provisions designed to promote the development and application of innovative and alternative treatment processes which would be cheaper and simpler to construct, operate and maintain, more reliable and energy-efficient, and which would achieve recycling, reclamation or reuse of water and other resources. Third, recognizing for the first time that full secondary treatment by municipalities was not justified in all cases, it authorized the Administrator of EPA to grant waivers allowing lesser levels of treatment to coastal communities discharging their wastes through outfalls into ocean waters, provided certain environmental safeguards were assured.

In the years since, some 2,500 of the total 18,995 municipal treatment facilities expected to be constructed under the program have been built and placed in service. An additional 4,200 plants now under construction are expected to be completed within the next three years. Yet the 1980 Needs Survey conducted by EPA identifies the remaining needs totaling $120 billion for categories of construction now eligible for funding.

Legislation now pending in the Senate, and proposals put forth earlier this year by the Administration, seek to limit federal participation, or the federal fiscal "exposure," in meeting these municipal clean-up requirements. Unfortunately, these proposals may do little other than shift more of the cost of complying with federal clean-up requirements to State and local governments. Further, while cutting back the amount of annual federal aid, the proposals make no provision for adjustment of the compliance deadlines. Consequently, while the obligation to comply with these deadlines would remain, the means to do so would be out of reach for many.

Regardless of the merits or fate of these proposals, an effort of considerable magnitude will be required for the forseeable future if even minimal needs are to be met, and this suggests that it is reasonable to expect a large volume of new construction beyond that now funded.

Clean-up of municipal wastewater discharges, however, is not the inevitable result of authorizations, appropriations or expenditures, of plans, specifications and estimates, or pipes, tanks and equipment. It results from treatment plants and related facilities that are properly designed, constructed, equipped, operated and maintained. Ul-

[3] The 1977 Amendments also made changes to those provisions that affect the industrial regulatory requirements contained in the 1972 legislation. However, as these have been addressed in some length in the Subcommittee's December 1980 report, this discussion is limited to those that have primary impact on the Construction Grants Program.

timately, all that goes into a treatment works must be translated into plant performance if the massive public investment in the program is to be realized in terms of environmental benefit.

Yet, so far as plant performance is concerned, the track record has been perceived, at least until recently, as very poor. It prompted a former Subcommittee Chairman at the close of oversight hearings on this same program in 1978 to observe that: "We simply cannot ignore the incongruity of spending $5 billion a year in federal funds for new plants with the foreknowledge that only a fraction of them will be operated properly or at a cost that can be afforded locally. This is absurd."

And indeed, the performance of municipal wastewater treatment works constructed with federal assistance is not satisfactory. There have been some spectacular failures. Survey after survey done by EPA, the General Accounting Office and others has shown lack of compliance with permit requirements or design parameters. They all agree that there are problems; only the numbers or percentages vary.

But the plant performance issue must be seen in proper perspective. While the Construction Grants Program cannot be adjudged a resounding success, neither can it be branded a failure. It has its successes, and they are the rule rather than the exception. A majority of plants are either in compliance or close to it. And only one-third or less have "significant" problems, many of which can be remedied without great expense. Further, many of those which do not perform satisfactorily, including some of the serious problem plants, were planned, designed and constructed under the rules and regulations of the "old law," Public Law 84–660, and their shortcomings can not be totally attributed to the current law or program. Therefore, any blanket indictment of the program is baseless.

Even plants indisputably performing poorly can make a significant contribution to water quality. For example, the largest treatment works in Atlanta, Georgia, distinguished until recently by an abysmal record of operation and maintenance, helped end the gross pollution of the Chattahoochee River once caused by massive discharges of raw and partially treated sewage. The plant at San Jose, California, rated by the State Water Resources Control Board as having the most severe performance problem in the State, produces a treated effluent near drinking water in quality most of the year.

The focus of concern should not be the majority of plants, but the minority with significant performance problems. Funds spent for municipal clean-up should not be wasted due to the poor performance of facilities constructed with federal grant dollars. Even a small percentage of failures or substandard performance in this large a program can mean that the public is not getting its money's worth, or the full environmental and health benefit from a huge investment in facilities.

If the program is not satisfactory today, the Subcommittee is convinced that it can be made so, given the appropriate efforts by all concerned. In fact, there is enough in the way of successes, and the competence and commitment that made them possible, that there is no valid excuse for poor performance.

To assure satisfactory performance there is also some need for reform: legislative, administrative, and improvements on the part of

the entire complex of public and private entities involved in the program. Encouragingly, the Subcommittee sees the basis for significant improvements in several scattered initiatives in the States and municipalities which could be emulated elsewhere, in private sector efforts independently or in cooperation with EPA, and in efforts by the agency itself. These, plus a modest number of legislative amendments, offer solid promise of getting the program on track. Whether that promise is achieved, however, will depend largely on whether the program finally achieves relative predictability, continuity and stability in administration and funding.

III—Dimensions of the Plant Performance Problem

Prior to 1980, existing surveys and evaluations of municipal wastewater treatment plant performance, be they by the Environmental Protection Agency, the General Accounting Office, the Water Pollution Control Federation or others, provided only limited information on the seriousness of plant operation and maintenance deficiencies. While they all seemed to establish that half or more of existing treatment works periodically were unable to comply with either their discharge permit requirements, their design standards, or both, they gave little information as to the cause of poor performance, its duration, the extent to which a plant deviated from its intended level of performance, or what was necessary to remedy a problem—a small investment in training or some additional chemicals, or massive investments for replacement or upgrading of the plant.

Consequently, at this Subcommittee's request, GAO undertook a survey of 242 major plants in ten States to shed some light on these concerns. It's findings: Of the 242 plants surveyed, 211 were found in violation at some time to some extent. Of those, 66 were found to be in serious violation,[4] often exceeding their discharge limitations by several hundred percent. While much attention has been focused on a noncompliance figure of 87 percent, the same statistics show that 73 percent of the plants surveyed are in compliance with their permit requirements or out of compliance only to a minor extent, and thereby providing considerable clean-up.

The remaining 27 percent identified by GAO as serious violators fall in the same range as the 22 percent of major plants having serious noncompliance problems, according to EPA's most recent national survey. U.S. Environmental Protection Agency Administrator Anne M. Gorsuch also testified that there has been a dramatic improvement in plant performance between 1975 and 1980, with the percentage of plants meeting or exceeding secondary standards increasing from 40 to 75 percent.

The 1980 GAO study also examined several "worst cases" selected by EPA or State officials in order to evaluate the causes of treatment facility problems, and what was being done to correct them. The Subcommittee felt, and continues to believe, that in a program that has been repeatedly shown to have limited management resources, it would only make sense that these limited resources would be

[4] Because of the absence of any federal or State standard as to what constituted "serious" noncompliance, GAO, for the purposes of this review, established this as being a violation of certain major NPDES discharge permit parameters by more than 50 percent for a period of more than 4 consecutive months, a definition many EPA officials believe to be too conservative

devoted to the worst, or most troublesome situations. Yet, again, GAO's findings paint a less than encouraging picture:

> EPA and the States have tried to correct performance problems at wastewater treatment plants, but their attempts have not been timely or effective in bringing plants into compliance with their discharge permits. Nor does the situation seem to be improving. * * * Problems have existed in some cases for more than 8 years.

In response to the GAO report, several States have conducted their own surveys of plant performance. California, for example, conducted two surveys. The first covered 61 plants with a design capacity exceeding three million gallons per day (mgd) and accounting for 40 percent of the total wastewater flow in the State. Its findings: Satisfactory operation, 51 or 84 percent; minor problems, 5 or 8 percent; major problems, another 5 or 8 percent. The second covered 100 plants in the central portion of the State regardless of size or treatment process. The findings: Satisfactory operation, 86; minor problems, 13; major problems, one.

Also in response to the GAO report, the Association of Metropolitan Sewerage Agencies surveyed its member agencies, among the largest systems in the country, and received responses covering approximately 100 plants operated by 45 metropolitan entities. Strongly critical of the GAO findings as excessively negative, AMSA used GAO's definition of serious violation for purposes of comparability and ironically gave poorer marks to the program, reporting that only 66 percent of the plants surveyed had either minor violations or no violations at all. GAO's total for the two categories combined: 73 percent.

Another survey triggered by the GAO report was undertaken by the State of Illinois, covering 350 plants expanded or upgraded during the decade of the 1970's. Reported Roger A. Kanerva, manager of environmental programs for the State's Environmental Protection Agency: "Our results showed that 'severe' noncompliance was the exception rather than the rule. Only four facilities out of 123 greater than 1.0 mgd (3 percent) were found to be in 'severe' noncompliance (same criteria as GAO report)." The Illinois EPA survey, focused on biochemical oxygen demand as a measure of performance, showed a compliance rate of 98.5 percent for the plants studied.

At a field hearing in Atlanta last spring, the Regional Administrator for EPA Region IV reported that, of 118 plants planned, designed, constructed and placed in operation under requirements of the 1972 Act, 85 percent are meeting their permit requirements. Added the Region IV Administrator: "We have recently begun funding start-up services for POTW's [publicly owned treatment works] for a period of up to one year after completing construction and we fully expect that the remaining 15 percent of these Public Law 92–500 plants not now in compliance will meet their permit limits."

Several witnesses insisted—rightly, in the Subcommittee's judgment—that permit compliance is not synonymous with plant performance. Plants marginally out of compliance can in fact be doing their job and doing it well. Permit violations can and do reflect the fact that requirements imposed on a given plant are sometimes inappropriate to its design and more stringent than those in effect when it was constructed. In large part, this stemmed from

the sequence of events that occurred as federal and State officials attempted to implement the new National Pollutant Discharge Elimination System (NPDES) permit program called for by the 1972 law. Kanerva of Illinois described it to the Subcommittee this way:

> There was a lot of debate that went on when many of the initial NPDES regulations were being established. A tremendous amount of work had to get done in a short period of time * * * The States had to scramble to get [EPA] delegations [of the permit program] going, so a lot of things got handled too quickly * * * But what really came out of the system was that those NPDES permit limitations became viewed as strict liability numbers—numbers in and of themselves without recognition of all of the technical nuances that were involved behind the determination of these numbers.

Indeed, plants designed under Public Law 84–660, many of which are comparatively new, having been built during the decade of the 1970's, were never designed to meet secondary treatment as currently defined. For example, many plants were designed to provide 85 percent removal on an annual basis and not to meet any monthly numerical limitation such as 30 parts per million biochemical oxygen demand (BOD) or suspended solids (SS) as called for by EPA's current regulations. Literally, the rules were changed in the middle of the game. (The EPA regulation defining secondary treatment was not issued until August 1973, and many facilities were simply required to meet the new performance requirements without the benefit of any real evaluation of their capabilities to do so.)

Such was the case with the problem-plagued treatment works in Atlanta, discussed further below, and in many other plants commented on by witnesses. Lindsay Collins, Chief Engineer-Administrator for New Hampshire's Water Supply and Pollution Control Commission described how a plant can be marginally out of compliance and still regarded as being a successful project:

> Based strictly on the results of sampling, we did have plants which did not met their discharge permit requirements. We believe that going strictly by the numbers, improper conclusions as to violations have been reached. During this report period, [of 1978 to 1979] a majority of the plants constructed under Public Law 92–500 were being put in operation with construction just completed in the fall of the year and their initial startups carried on during subzero weather with flows considerably below design capacity. We find that once additional flows are added to a treatment plant, operation is improved. * * * In addition, laboratory personnel at the treatment plants were in the training stage as documented by the Quality Assurance [for testing] carried on by EPA. As a result, we do not consider the permit violations in New Hampshire to be of a serious nature.

In the same vein, the general counsel for the St. Louis metropolitan sewerage agency suggested the analogy of the 55 mph speed limit. Minor permit violations, like exceeding the limit by a few miles per hour, should not obscure the fact that marginally noncomplying treatment plants are still removing vast amounts of pollutants from wastewater just as the lower speed limit has reduced highway speeds.

Conversely, there are situations where permit compliance data fail to reveal what can often be serious and even costly problems. As observed earlier, the State of California deems the San Jose/Santa Clara wastewater treatment facility as that State's most serious operation and maintenance problem. While the discharge from the plant often meets or exceeds drinking water criteria, design deficiencies

that periodically affected that plant's ability to continously meet its discharge requirements will cost a minimum of $20 million to correct.

Nonetheless, the Subcommittee considers scrutiny of permit compliance to be a useful indicator in helping to identify emerging performance problems. And to the extent that permit violations do not reflect environmental harm, they call into question the appropriateness of the permit requirements which the public is spending vast sums to meet.

There is evidence in the record suggesting that requirements can indeed be excessive in terms of the degree of treatment necessary to protect a given reach of river, and, as mentioned previously, that many permits are inappropriate for the facilities to which they have been issued. In this regard, it is not the integrity of the Construction Grants Program that must be questioned, but that of the National Pollutant Discharge Elimination System (NPDES) permit program, upon which many of the remedial actions proposed to the Subcommittee by EPA are being based. These are discussed in later sections of this report.

While the overall record of performance of the vast majority of plants is good, the number of those in serious noncompliance, with problems which can't be accounted for by "paper" violations and extenuating circumstances, is sizable, possibly as many as one of every five plants in operation.

IV—Principal Causes of Plant Performance Problems

There are many causes of treatment plant performance problems, and depending on the study or review being used, they can be grouped into as few as three categories or as many as 70. For example, EPA's Municipal Environmental Research Laboratory in Cincinnati sponsored a study of 287 facilities in 18 States, with a detailed investigation of 103 plants over a period of three-and-a-half years. This study isolated 70 separate problems or factors affecting performance. Of the 10 most important, six were related to design and four to operations.

In contrast, GAO groups these causes into five general categories: design deficiencies, equipment deficiencies; overloads stemming from infiltration and inflow of storm and ground waters into sewage collection systems (and in some instances the high flows that occur during storms in cities with combined sanitary and storm drainage systems), industrial waste overloads, and poor operation and maintenance practices.

However they are grouped, these causes of performance problems have been identified repeatedly by the EPA, GAO and others over the past 10 to 12 years. Further, if there is any one conclusion that is drawn from them, it is that there is no one cause or group of causes of plant problems and that remedial programs that ignore this are inevitably going to have only limited if any results. Rather, the mix of contributing factors is different in each instance, often reflecting the very complexity of both the plants themselves, and the technology or biochemistry that is involved.

OPERATION AND MAINTENANCE (O&M)

Wastewater treatment works—and particularly the ones most appropriate to large municipal systems—employ complex and sophisticated technologies closely resembling manufacturing processes.[5] Far from fitting the image of "glorified outhouses," in words of one witness, they require a higher level of skilled and consciencious operation than do drinking water treatment plants. Unlike both manufacturing and water treatment works, they handle a raw material which varies beyond the control of the operator in the form of wastewater, fluctuating widely in strength, composition and volume. And unlike the predictable "cold chemistry" of a manufacturing operation, their process is biological and hence inherently unstable to a degree and vulnerable to upset. A witness from Detroit, a city which has experienced innumerable problems over the past few years, compared one of the most commonly used biological wastewater technologies to an ordinary human being:

> They get out of sorts and you cannot figure out why. They are subject to upsets. They must be gently managed. If they are not gently managed you can get them out of sorts and you cannot get them back into compliance in a hurry . . . It is just like having a sick aunt who might be a hypochondriac. You cannot figure what the problem is.

A paper issued by the Water Pollution Control Federation in May of 1979 adds further perspective to the situation: "No matter how well planned, how well designed, or how well constructed, the problem will not be solved unless provisions are made for proper O&M of the facilities. Emphasis on this area was greatly overlooked in our haste to get waste treatment systems in place and on-line." After enumerating a number of efforts by EPA in the mid-to-late 1970's, the Federation statement continued: "In spite of the procedures mentioned, the serious problem of noncompliance by many of the treatment systems still exist . . . This is a sad commentary on the time, the effort, and the money that have been put into solving the problem to date."

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[5] In contrast to treatment works built during the early part of this century, today's plants are complex. The following provides a simplified description of what is involved:

Primary treatment consists of (1) screening out of substances likely to clog the treatment works, (2) capture of grit (sand and fine gravel chiefly originating in storm sewers) in "grit chambers," followed by (3) removal of some solids in large settling tanks known as primary clarifiers. (Disposal of the residue, known as primary sludge or raw sludge, will be discussed below.)

Secondary treatment, as most commonly employed, is a biological process which essentially duplicates—in intensified form—the same process which naturally occurs in rivers and streams. The bacteria normally present in sewage consume pollutants (food) in the wastewater. This is facilitated by the presence of oxygen which is necessary for the bacteria to live, function and grow, and to break down the pollutants. In a biological secondary treatment plant, a large culture of these organisms is maintained at all times and brought into contact with the wastewater in the presence of oxygen—an areobic process.

Mechanically, the secondary biological process most commonly employed consists of aeration chambers in which a mass of biological organisms known as activated sludge is introduced into the wastewater. Mixing action and oxygen are provided by pressurized air piped into treatment tanks, or through the use of large mechanical mixers. After a period of some hours (retention time), the wastewater with its suspended mix of activated sludge is transferred to another set of settlement tanks known as secondary or final clarifiers, where the activated sludge settles out. A significant portion of the activated sludge is recycled back to the aeration tanks, while the remainder is processed through the "sludge handling" facilities. The secondary effluent is chlorinated for disinfection (destruction of bacteria) and discharged to the receiving stream

Sludge handling consists of processes to concentrate the sludge (thickeners), provide further biological breakdown of the sludge (digesters with or without oxygen), dewatering and final disposal.

Wastewater separated from the sludge in the thickening, digestion, and dewatering processes is recirculated to the primary or secondary facilities for further treatment.

As the foregoing discussion suggests, a modern secondary treatment plant is a fairly sophisticated operation resembling a manufacturing process, except that its function is not to combine or synthesize materials, but to separate them—solids from wastewater.

TWO CITIES: A STUDY IN CONTRAST

A classic instance of poor operation and maintenance and its role in deficient plant performance was analyzed by the Subcommittee at a field hearing in Atlanta, Georgia, in May, 1981, to examine the city's R. M. Clayton Water Pollution Control Plant.

A chronic and serious violator of its discharge permit requirements, this $52 million plant was designed to handle 120 million gallons of sewage per day (mgd). However, it was actually handling a wastewater load of only 80 mgd, two-thirds of its design capacity, suggesting that its excess treatment capacity was compensating to some degree for poor performance capability. Further, its operation created such an odor nuisance in the area that the State was considering forcing the city to enclose the plant in giant fiberglass or aluminum domes to control the problem, with the federal program picking up 75 percent of the cost. This was less out of a concern that the odors could not be controlled by efficient operation than a conviction that the city could not be relied upon to run the plant properly. The plant was also slated for upgrading to meet a level of treatment beyond secondary, to meet water quality needs, at a cost of roughly $50 million. Yet, given the multi-year history of poor performance, many question whether the city will run the upgraded facility any better than it did the plant it already had.

The Subcommittee concluded that the R. M. Clayton plant's problems stemmed primarily from municipal apathy. True, the plant is indeed a sophisticated one, highly vulnerable to upset and unforgiving of lax operation. But, as a result of long-delayed management and maintenance improvements undertaken by the city—prodded every step of the way by State fines, enforcement orders and a sewer connection ban at various times—this plant finally met its permit requirements at the time of the Subcommittee hearing. This despite the fact that it was designed under the earlier clean water law, P.L. 84–660 for 85 percent removal, not the current definition of secondary treatment—30 parts per million concentration of BOD and solids—set by EPA under the current law, P.L. 92–500.

During the Atlanta hearing, the Director of the city's Bureau of Pollution Control and his immediate superior, the Commissioner of Environment and Streets, confirmed for the record the accuracy of the following description of the R. M. Clayton plant's history of problems:

Operation and Maintenance.—Newly upgraded at a cost of $52 million, the R. M. Clayton plant went into service without a full complement of fully trained staff or an inventory of spare parts for its highly sensitive equipment.

Staffing problems persisted for years, including untrained, unmotivated personnel, understaffing, frequent turnover or reductions in force (associated with hiring constraints and use of CETA employees). Disciplinary problems have been severe, including absenteeism, tardiness, refusal to accept work assignments, threat of bodily harm to a supervisor, theft of materials and equipment (possibly by employees, possibly by outsiders; plant security is weak), and sabotage of equipment.

Staffing is said to be improved, but training remains a continuing problem, with budget requests for training denied or significantly reduced. Maintenance has been slighted, and that maintenance performed has been primarily in the repair category with preventive maintenance slighted, a situation again said to be improving.

The lack of spare parts, in combination with the sensitivity of the system and the caliber of O&M, became critical during 1977, 1978, and part of 1979, when

frequent breakdowns plagued the blower system providing air to the secondary aeration process. Without air, the treatment essentially stops, sewage builds up in the plant and often goes 'septic,' giving off highly offensive odors.

At one point, the city refused for months to order repair parts because the sole supplier of components declined to supply documentation required under the city's affirmative action policies applicable to contractors and suppliers. (This situation has improved; the city now will grant waivers in the case of sole-source purchases; the city is said to have granted a waiver within two hours recently in the case of the purchase of a $282,000 centrifuge.)

While the city's Commissioner of Environment rejects the term, nothing but apathy can account for this performance which, it must be said in fairness, has persisted for decades under successive local administrations. To this day, training is slighted, and the Subcommittee found that an appalling lack of urgency recently resulted in the denial of a modest request for training funds. Despite widespread knowledge of problems at the plant, the bureaucratic budget process wrung any sense of priority from the request as it worked its way through the mill, and the burial was effected by a minor functionary dissatisfied with the extent of documentation accompanying the request.

A heartening contrast is the performance of a plant at Wilmington, Delaware, a facility designed to accommodate a daily average flow of 90 million gallons per day from the city and adjoining Newcastle County. The plant is currently treating 70 mgd, a flow increasing at the rate of one mgd per year. As a result of expansion conducted in 1970–1973 at a cost of $29.4 million, the facility now consists of primary, secondary and tertiary treatment achieving an average 93.5 percent removal of BOD and 97 percent solids. The plant consistently meets its discharge permit requirements, according to testimony.

The successful operation was not achieved automatically, according to the city's Commissioner of Public Works, William Turner. Disputes had to be resolved concerning such matters as a single regional plant vs. several smaller ones, and the types and numbers of treatment processes. But they were resolved, and success is attributed to cooperation by city, county, State, regional and federal agencies, plus the services of a practical and competent consulting engineering firm which has long served the city, and a "willingness to spend the necessary funds."

Yet, the Wilmington operation has had its share of operating problems. The plant has experienced flooding as a result of the collapse of a 35-foot-high dredge spoil dike, the tilting of a ten-ton floating sludge digester cover 90 feet in diameter, and a slug of chemicals that upset the treatment process. Concluded Turner:

> The point of this is that one can expect problems of almost any magnitude. They can only be dealt with by a competent, dedicated staff of engineers, managers, mechanics and operators. The proper operation of wastewater treatment plants now requires a higher degree of training for those responsible for performance. *If I had to make a single recommendation, it would be to emphasize training programs and licensing of plant operators.* (Emphasis added.)

In some instances, communities have turned to outside firms to obtain the expertise necessary to overcome treatment plant problems, and testimony to the Subcommittee by an official of one of these environmental services firms further confirms that poor O&M can guarantee that even the best designed and built plants will fail, while good O&M can sometimes compensate even for design deficiencies.

Paul Eisenhardt, general manager, Envirotech Operating Services, whose firm has provided assistance to municipalities under 80 contracts, conducted some 30–40 plant evaluations, and currently operates 15 facilities on a long-term contractual basis for municipalities, cited three instances in which a poorly operated plant can be turned around by improved operations and maintenance or start-up assistance can promptly achieve compliance.

The first of these was a secondary treatment plant which was violating its effluent requirements, causing odors and the shutdown of nearby shellfish beds. Its problems were further aggravated by seasonal loads from a canning facility. Lawsuits were being prepared alleging improper plant design and performance of equipment. A private operations contractor took over the plant, contractually committed to meet permit requirements, under a fixed budget, and by improved operation achieved compliance with the result that odors are no longer a problem and lawsuits were dropped.

The second example involved a secondary treatment plant which had yet to meet its permit requirements for a 30-day period; plant modifications were under study in the belief that design deficiencies were causing the problem. Contract operations achieved sufficient O&M improvements to turn this plant around within five months. This enabled the plant to meet discharge requirements for the next 18 months, and make it possible for the municipality to abandon plans for modification and consider retargeting the funds involved to expansion to accommodate projected growth.

In yet another situation, similar assistance was provided for six months prior to start-up of a $50 million facility providing a level of treatment well beyond secondary for effluent discharged into a major marshland and bird sanctuary. While lengthy start-up problems are commonly encountered even with the best-built facility, this plant met its requirements within five days and remained in compliance consistently for the ensuing three years.

OPERATOR TRAINING

As noted in the Atlanta case, the lack of a properly trained staff can dramatically affect the performance of a treatment works. In fact, inadequate training of operating personnel has been identified as a major cause of poor plant performance in virtually every study of treatment plant O&M ever conducted. Yet, only limited resources have been devoted to this concern over the past several years, and only recently has this factor gained increasing attention.

The seriousness of the training problem and its significance to treatment plant performance was sharply defined in testimony to the Subcommittee by EPA's John Smith, head of the Urban Systems Management Section of the Agency's Municipal Environmental Research Laboratory in Cincinnati, Ohio. A report on some of the results of a recently completed major study of treatment plant operation and maintenance by Smith and his associates states:

> Existing programs to train operators and provide them with the required information to properly monitor, control, and operate their plants are ineffective. Operators have not been able to transfer their classroom instruction to practical on-site problem solving; they do not use much of the guidance and instructional

materials provided by the federal programs because they do not understand them, and they are provided with often conflicting information from a variety of sources that are not held accountable for the instruction provided.

As a result, treatment plant operations continue to suffer, and numerous plants fail to operate properly, be they large or small, old or new. Kirk Laflin, Director of the New England Regional Wastewater Institute, which operates a mobile training program, testified:

> One particular State, which happened to be New Hampshire, called us in [to look at] a small rural community in which the treatment plant operators, one of whom was from the construction company of the treatment plant and the other gentleman was from the public works department, were having problems. They were given the keys to take over the plant and basically the plant was running the operators . . . They had been handed a set of [operation and maintenance] manuals and told: "This is how you operate the plant," and that is the way it went.

As noted earlier in this report, properly trained operators can not only ensure that the full capital investment in pollution abatement is realized, they can also do a great deal to rectify existing problems in many plants. Commented Water Pollution Control Federation's President Carmen Guarino: "Not even the best designed and equipped plant will meet its [discharge] permit if you do not have the right people running it."

Unfortunately, there are simply too few to do the job. Since 1972, some 3,200 additional treatment works have been placed in operation under the current EPA Construction Grants Program, and an additional 4,200 plants are expected to go on-line within the next three years. As many as 3,000 additional personnel may be needed to staff these plants.

The Congress, in anticipation of this need for trained and skilled operators, authorized, under Section 104 of the Act, pilot programs for training treatment plant personnel, and programs to train "trainers," provide technical assistance, and to make grants to other institutions to conduct training. Grants to colleges and universities were authorized to provide assistance to students in the wastewater engineering and related fields. States were also authorized under another section of the law to use construction grants funds for the construction of wastewater treatment plants to be used for training personnel in each State. In all, several hundred million dollars have been authorized for these purposes since 1972. Little of this has been used, however.[6]

Between 1973 and 1978 EPA held expenditures for manpower training to about $1 million annually. Funding for substantive manpower planning has been nonexistent over this same period, and expenditures for graduate training have been reduced by more than 85 percent to $820,000 annually, the monies being provided by Congress in the face of EPA efforts to eliminate this latter activity altogether. EPA reduced the number of staff to one in each of its ten regional offices and a handful at headquarters. Further, many States have also drastically cut back or totally eliminated whatever training or technical assistance effort they had previously provided.

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[6] Grants for the construction of training treatment plants were to be paid from funds allotted to each State under the Construction Grants Program authorizations, and not from the other mentioned funds, and are therefore not included in this instance. However, even here, only a handful of these training facilities have been constructed.

In place of this, EPA has substituted a number of alternatives, most of which have been of only limited effectiveness, or are too recent to evaluate. For example, in 1977, EPA issued two guidance documents allowing grant communities to use federal funds during the final phases of construction and during initial plant start-up to assist in the cost of training key plant personnel. Many believe this to be too little or too late in the process, and have recommended that the one year period of eligibility be extended to two years.

During the period between 1976 to 1980, the agency's policies for dealing with O&M problems moved it even further away from direct involvement in training or technical assistance. Claiming that it lacked the resources—money, manpower, and expertise—to assist the thousands of communities which often need help, and that its involvement might undercut any subsequent enforcement action, EPA declared that it would rely on private sector resources and an aggressive enforcement program to prod communities into acquiring the necessary expertise and training, and into complying with their discharge permits. Here again, however, there seems to be more promise than performance.

As will be noted in a subsequent section, there has in fact been nothing that could be called an aggressive municipal enforcement program. And with respect to the reliance on private sector efforts, the jury is still out. While initial results look promising, GAO's December 1980 report to the Subcommittee noted that after three-years of effort, ". . . EPA is still attempting to establish the link between the private sector and municipalities for technical assistance."

As a result, many communities continue to find it difficult to recruit and retain qualified personnel. The fact that many local governments also refuse to pay competitive wages for these positions also makes it difficult to retain good people, particularly after additional investments in time and money have been made to upgrade their skills. Noted Martin J. Manning, Deputy Director for Utilities, Houston, Texas Public Works Department:

> We forayed during the last year up to Detroit, Cleveland, and Philadelphia and hired about 50 additional personnel who no sooner became part of our system than they migrated to our Channel area industry, which also has an interest in process operators and are willing to pay them more. So we found that we are performing a social function by educating process operators for private industry without the likelihood of retention.

Testimony during the Subcommittee's 1981 oversight hearings indicates that attitudes about providing technical assistance, and to a lesser extent, training, may finally be changing. EPA is developing a Wastewater Utility Management Manual which will provide wastewater utility managers with various types of financial, organizational and other types of guidance for sustaining sound long-term management of treatment facilities. And for those that are approaching the start-up of new or upgraded facilities, the agency developed, in January, 1981, an integrated management program to coordinate all of the various activities critical to the plant's performance.

Probably the most significant advancement in this area, however, is the agency's efforts to begin using an approach to compliance enforcement activities developed in mid-1979 that emphasizes remedial measures such as training of operators. Under its new policy, treat-

ment works that are not meeting their NPDES discharge permit requirements will be required to call in a private sector evaluation team to conduct a thorough analysis of their problems and to recommend a "comprehensive correction plan" (CCP). This plan, which can and does include training programs, in turn, becomes the cornerstone of the enforcement action.

The major benefit of this CCP approach is that rather than simply fining the city, with the funds ending up in the U.S. Treasury, it essentially forces the community to spend equivalent amounts on restoring proper operation at its plant. EPA's John Smith estimates that as many as 70 percent of presently noncomplying plants nationwide could be corrected at an average cost of from $10,000 to $25,000 per plant (1977 dollars).

Training, as part of or separate from technical assistance, is both affordable and cost effective. According to the New England Interstate Water Pollution Control Commission's Executive Secretary, Alfred E. Peloquin, the cost of training an operator in that Commission's nine-month program held each year at the New England Regional Wastewater Institute in South Portland, Maine, is $790 each. Further, the Institute's mobile training facility is able to travel throughout the region providing specialized help to personnel right in their own plant at a cost of about $130 per trainee. And the results of this training can be significant. Noted NERWI's director, Kirk Laflin:

> We went into one particular plant where they were continually having problems with the pumps . . . many were not pumping properly and upon looking at the particular plans, we found out the pumps, number one, were not made for that particular operation; number two, the O&M manuals were not written for that particular purpose to begin with and after an educational program on the pump and adequate maintenance, the operators finally realized exactly what the pumps were supposed to do and proceeded to properly maintain them.

PLANT DESIGN

That design deficiencies are a problem is beyond dispute. This has been amply documented by GAO and EPA, and is acknowledged by private professionals in the field.

Smith, of EPA's Cincinnati Laboratory, has noted that of 70 factors limiting plant performance, nearly half involve design. (Smith and his associates break down plant performance problems by design, maintenance, operation and administration, while GAO categorizes them as design, equipment, infiltration and inflow (I&I), and operation and maintenance. Thus the EPA's Cincinnati group categorized I&I, industrial overloads, toxic loadings, seasonal variations, etc., as design problems.)

In his testimony, Smith reported on his and other EPA studies of design deficiencies which have "identified 562 separate kinds of design deficiencies that have occurred in one or more of 146 individual plant components yielding a total of 3,260 distinct design flaws or errors that have contributed directly or indirectly to inadequate plant performance."

William R. Gibbs, a consulting engineer from Kansas City, Missouri, representing the American Society of Civil Engineers, when asked what percentage of plants are properly designed, responded: "I would say that probably 80 percent of the plants are adequately designed."

A fellow witness, John R. Loveland, a consulting engineer from Syracuse, New York, put the figure at 90 percent. This means that anywhere from 10 to 20 percent of plants are not adequately designed.

An example of inadequate design—and a plant unable to handle seasonal industrial loads—is the treatment works serving San Jose, California, and adjoining Santa Clara County. Representing a total public investment of $117.5 million since 1961, this plant has undergone extensive expansion and upgrading since 1972 at a cost of $88.3 million, including federal grants totaling $72.3 million. It consists of primary treatment, secondary aeration, and a tertiary filtration process required to meet water quality needs of South San Francisco Bay. This is a relatively motionless body of water, subject to little flushing action, whose principal problem is a low level of dissolved oxygen.

As a part of the upgrading mentioned above, the plant was expanded from a primary and secondary capacity of 94 million gallons per day to 160 million mgd between 1972 and 1979 at a total cost of $17.9 million. This was accompanied by the advanced waste treatment facilities costing $40 million between 1976 and 1979, with a capacity of only 143 million mgd. According to testimony by John Eastus, Deputy City Manager of San Jose, this limitation on plant capacity was mandated by the State, contrary to the city's wishes, in keeping with California's policy of limiting growth by restricting capacity. This decision, reflecting a political decision rather than design incompentence, in effect rendered useless 17 million gallons per day of primary and secondary treatment capacity. But only on paper; subsequent events demonstrated that the capacity wasn't there to begin with.

The principal problem with the plant's performance is its inability to handle seasonal overloads in mid-to-late summer when canning plants contributing to the system are in operation. Following a severe upset in the summer of 1979, a consultant examining the plant determined that its real capacity is only 122 mgd. According to testimony, the original consulting engineering firm, Consoer, Townsend and Associates, failed to provide for increases in aeration capability[7] at the time the secondary treatment process' physical ability to handle increased wastewater was expanded. This suggests a capacity deficiency of roughly 20 mgd. In addition, the amount of treated wastewater needed to back-flush the filtration portion of the advanced waste treatment process is an incredibly large 15 mgd. Declared Eastus in his testimony:

> During the construction phase from 1972 to 1979, consulting engineers failed to provide facilities that met design criteria and also failed to provide adequate redundancy to reduce operational risk under 10 mg/l [parts per million] biochemical oxygen demand (BOD) and suspended solids effluent standard. . . . The deficiencies are now being rectified with the aid of grant funds to restore the capacity of the originally authorized 143 million gallons per day capacity.

Just to achieve this capacity will cost some $20 million, and federal grant funds are being sought. An exception to EPA's and California's policies prohibiting "fix-up" grants apparently is being made in this

[7] The San Jose, Santa Clara plant uses a treatment technology that is highly dependent on the quantity of oxygen, or air, that is supplied to the treatment units. The technology is similar to that found in most municipal treatment works around the nation that have secondary treatment.

case, but only on the condition that the City of San Jose attempt to recover damages against any parties responsible for the problem, including the engineering consultant. Therefore, according to Eastus: "The City Council has authorized our City Attorney to pursue whatever legal remedy he may be able to pursue against these particular design consultants and other contractors who have done work for us."

Despite these problems, this plant achieves during normal operation a treated effluent of 2 parts per million BOD and solids, well below the 10 parts per million required by its discharge permit, removing 490,000 pounds of BOD and 40 tons of suspended solids per day. Even during periods of seasonal upset, the plant has managed to produce a treated effluent well within or close to the national minimum secondary treatment standards imposed by EPA.

A number of "horror" stories involving design problems—compounded by regulatory and management deficiencies—are also to be found in Detroit, according to the water pollution control official who now runs the City's system under a court order. Joe G. Moore, Jr., a former Commissioner of the Federal Water Pollution Control Administration (a predecessor of EPA) and Program Director of the National Commission on Water Quality in the mid-1970's, testified as Assistant Administrator of the Detroit Wastewater Treatment Plant, serving directly under the Mayor, who was directed by a federal court to personally take over the plant.

One of these stories involved operation of the plant's secondary clarifiers, the tanks in which the mass of pollution-consuming bacteria known as activated sludge settles out of treated wastewater. The original innovative, award-winning design provided for introduction of the wastewater at the rim of the circular tanks (unlike conventional tanks into which the mixture of activated sludge and treated wastewater enters at the center). The design did not adequately consider the fact that activated sludge at the Detroit plant, which is combined with wastewater in the presence of pure oxygen, settles more slowly than sludge in a system using forced air for aeration. This resulted in spillage of activated sludge at the point where presuambly "clarified" wastewater leaves the settlement tanks—at the rim.

Ironically, design work to correct this problem received the 1980 Engineering Excellence Award by the American Consulting Engineers Council.

Another aspect of the Detroit "horror story" involved the fact that the plant's individual treatment processes vary widely as to their capacity to treat wastewater—a series of bulges and bottlenecks that effectively work to limit the total capacity of the plant—and the amount of treatment provided to the total wastewater flows.

The capacity of the secondary clarifiers is 805 million gallons per day, in comparison with other steps in the treatment chain: a pumping station of 984 mgd and a primary system of 1,200 mgd capacity. According to Moore:

> They thought they were building a plant that would take a thousand and 50 mgd through the whole process. . . . But it was not being constructed in sequence; it was being constructed irregularly, in pieces, and therefore, a secondary system was partially completed; the aeration system for secondary treatment

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was substantially completed. The clarifier system was not completed. For the primary system, they went ahead with two clarifiers just being completed that add 300 million gallons a day of primary capacity.

The presence of so many design or design-related causes of poor plant performance stems from a number of factors including the involvement of too many parties—including State and federal officials—in the design process, and the generous 75 percent federal share that tends to encourage the use of overly complex or sophisticated technologies. The interaction of these and several other factors on the design of treatment works is discussed in more detail in the next chapter.

EQUIPMENT

As we have observed, the modern treatment plant resembles a sophisticated industrial installation. Composed of concrete tanks and miles of pipes, motors, pumps, electrical controls, fans, winches, valves, monitoring sensors, conveyors, belts, compressors, vacuum filters, heating coils, computers—the list is virtually endless—these plants are indeed far more than the foul-smelling old settling tanks that many associate with wastewater treatment.

In fact, approximately 15 percent of the costs of the modern day treatment facility are attributable to complex and often sophisticated electrical and mechanical components, each of which is often critical to the proper functioning of the plant. Moreover, since many of the wastewater treatment systems commonly in use today are biological systems, they require a sensitive degree of balance lest they become upset and fail to perform properly. Plant operators frequently find their ability to achieve and maintain that balance and, hence, their mandated performance levels, highly dependent on the responsiveness of that equipment. In many instances, however, achieving this balance and responsiveness can be extremely difficult, if not impossible, due to equipment-related problems.

Improper installation of equipment, inappropriate equipment, or the failure to properly and routinely maintain vital components can wreak havoc with a plant's operation and frustrate the abilities of the best of operators to bring a malperforming plant under control.

Nor is it always easy to overcome some equipment problems once they have been identified. For example, the Atlanta R. M. Clayton treatment plant's blower system, essential to that plant's operation, required frequent replacement of critical gear couplings costing $50,000 to $75,000 each. Yet despite months of study by outside consultants, and the expenditure of thousands of dollars, no one was ever able to pin down the specific cause of the problem. Rather, additional "controls" were specified and installed at considerable expense to compensate for the erratic nature of the highly sensitive blower system.

In part, these types of situations stem from the inability of local officials, or those who design their plants, to obtain adequate information about the performance capabilities and reliability of equipment. Many accuse the equipment suppliers of intentionally overstating the capabilities of their equipment, a point the manufacturers themselves acknowledge. Others, however, lay even greater blame on the current procedures for selecting and acquiring treatment plant equipment.

THE "TWO OR EQUAL" CLAUSE

Under the law, designers of treatment plants, if they choose to specify a brand name of equipment, must use two brand names followed by the clause "or equal." This has often left contractors, at the time they make their bids, guessing as to whose equipment is equal. Commented Mr. P. R. Burn, Jr., a contractor from New Mexico:

> We have a terrible problem in bidding jobs because we frankly don't know if equipment being offered to us will meet the requirements of the engineer. We think that competition among equipment manufacturers is as it should be on an "or equal" basis. Our problem is in the determination of 30 minutes or an hour before bid time as to what is equal.

Some manufactures claim that the law's procurement requirement for equipment, the "or equal" clause, is also largely responsible for the poor performance of many of the nation's treatment works. All too often, they contend, lower priced and less reliable equipment is chosen or substituted for the name brand on which the bid was based, a practice called "bid shopping."

Manufacturers of lower-cost equipment take major exception to this, arguing that competition in the American marketplace is a fundamental right and that in the long run it should work to the benefit of all concerned.

Unfortunately, there is inadequate evidence to substantiate either claim. True, some plants have wound up with inferior equipment, and there is undoubtedly some bid-shopping going on in this program. Yet, the extent to which either the "or equal" clause or the practice of bid-shopping results in the use of inferior or deficient equipment, and thereby contributes to poor performance, is far from clear.

Recently, steps have been taken by the EPA, in concert with design engineers, equipment manufacturers and contractors, to develop a system whereby prior to the bidding process, various manufacturers' equipment is "qualified" as being "equal," and a list is made available to contractors at the time of bidding, thereby taking much of the guesswork out of the process. While this will not necessarily ensure that the chosen equipment will in fact perform as expected, it does favor this, and is felt to be a step in the right direction by all involved. The only drawback noted by some is that not enough is being done to promote the use of this "prequalification" system around the country. (Further discussion of the "or equal" issue is contained in the next section of this report).

INFILTRATION AND INFLOW (I&I)

Over the past several years, the excessive infiltration and inflow of fresh water into sewerage systems has become increasingly recognized as a significant problem for many communities, undermining efforts to operate their treatment plants properly and adding to the cost of treatment facility construction because of the added capacity required to handle these excess flows.

Freshwater infiltration into sewerage systems occurs when groundwater is able to enter a sewer through breaks, faulty joints, or cracks that often can result from deterioration of a system's lines, or service manholes. While some is inevitable due to the limitations of sewer

pipe materials and construction costs, much of it can be prevented at the time of construction, and, if a system is properly maintained, throughout the life of the system.

Another source of fresh water entering sewerage systems is "inflow." In many communities, storm and roof drains from houses, office buildings, and certain underground utilities are often connected to local sewerage lines. Together with the flows that can occur from openings in service manhole covers and from leaky faucets in homes, these sources of fresh water can equal that stemming from groundwater infiltration.

In combination, infiltration and inflow (I&I) in excessive amounts can wreak havoc with the best of sewage treatment systems and disrupt treatment processes. Massive increases in inflow to the treatment works can flush out the mass of microorganisms which break down pollutants in the secondary treatment process. Excessive dilution of wastewater at the plant reduces the pollutant strength of the wastewater to the point where the treatment process functions less effectively. And, finally, large volumes of infiltration can use up existing capacity, making it necessary to build more treatment plant capacity or, in the case of new facilities, larger plants than otherwise would be necessary.

Infiltration can also cause soil erosion around the sewer lines, leading to further damage and even major collapse. Additionally, faulty sewers can leak in two directions; in addition to allowing fresh water to leak in during periods of high groundwater, faulty lines can allow sewage to leak out and seep down through the underlying soil during dry conditions and contaminate groundwater.

The practical consequences of excessive infiltration were well illustrated by the St. Louis Metropolitan Sewer District. One of the District's plants, which serves 200,000 people, an airport and a major industrial plant, normally operates well below design capacity during dry weather. However, snow melts have, on occasion, boosted the plant's flow to 40 million gallons per day, at or near design capacity, and rainfall of a half-inch to three-quarters of an inch can raise the flow to 80 million gallons per day. When this latter situation occurs, the system's operators are confronted with the choice of bypasssng the excess flow around the treatment plant straight into the river, or allowing the overload to go straight through the plant, flushing out the secondary treatment process, resulting in poorly treated wastewater for ten days to two weeks.

Officials in St. Louis have studies under way to reduce the problem. Explained the Metropolitan Sanitary District's General Counsel, Charles Kaiser: "I really think that I&I is a tremendous problem that is not going to go away. I feel strongly that we must do something in particularly separate sewer systems to cut it out. When you take 25 to 40 to 80 [million gallons per day], you cannot build the plant for the 80; it would cost you 10 times more than doing something about the I & I."

Unfortunately, St. Louis' problems are not unique. In fact, nationally the problem is severe. EPA's Smith and his associates who analyzed problems affecting plant performance reported: "This [I&I] factor was ranked first at 56 of the 103 plants evaluated."

The Congress recognized the dimensions of this problem in enacting the 1972 Act, in which it specified that no grant could be made for treatment works "unless the applicant shows to the satisfaction of the Administrator that each sewer collection system discharging into such treatment works is not subject to excessive infiltration." Correction of I&I is an eligible category for funding under the program, and the 1980 Needs Survey listed needs in this category totaling $2.5 billion through the year 2000. Under EPA's regulations, the Federal Government will share in the costs of removing that quantity of I&I that is cheaper to eliminate than to treat.

Initially, estimates of the extent to which sewer system rehabilitation—replacement of pipe and resealing of joints—could reduce I&I were optimistic. A study of 16 of the earliest rehabilitation projects, done for EPA in 1980, informally known as the Conklin Report, demonstrated that actual reductions were far from satisfactory.

While estimates of reductions ranged from 39 to 99 percent before the fact, actual reductions were few in number and modest in amount. The highest was 60 percent, the next highest 23 and 24 percent, and the remainder far below that. In some instances there was no reduction, and in three an actual increase.

The findings of this study indicate that Sewer System Evaluation and Rehabilitation generally does not result in substantial system I/I flow reductions, primarily because of poor analytical techniques and deficient approaches to affecting rehabilitation. The consequence of this is that remaining I/I has used up all or substantial portions of the reserve capacity of new and upgraded treatment facilities and thus, shortened the plants' design lives.

The Conklin Report does not recommend that efforts to reduce I&I be abandoned. "I/I is not going to be removed by ignoring it," according to the report, which recommended several improvements in rehabilitation procedures.

In fact, it stated: "It is in the best interest of the community from a cost-effective perspective to continually evaluate and remove I/I that is less expensive to eliminate than to treat."

During the hearings, the Subcommittee received a substantial amount of testimony to the effect that, if anything, both the significance of I&I and the potential for correcting it have been severely understated. For example, Ralph G. Petroff, Chief Executive Officer, American Digital Systems, Inc., testified that standard design assumes treatment plant loadings of 80 gallons of wastewater and 20 gallons of infiltration per capita; but a study of 65 cities disclosed an actual per capita wastewater loading of 79 gallons per day, with infiltration running at the rate of 89 gallons under low groundwater conditions and 166 gallons during high groundwater conditions.

Additional data provided to the Subcommittee from others derived from I/I evaluations and analyses funded and conducted under the current Construction Grants Program, confirm that in many instances, infiltration alone, during dry conditions, can constitute 50 percent or more of the flow entering a treatment works, and during wet conditions can generate peak hydraulic flow several times that of dry weather. Since treatment works are normally designed to handle peak

flows, this factor can have a dramatic impact on the sizing and cost of a plant.

There is a strong argument that, when done correctly, I&I rehabilitation work can be up to 5 times more cost-effective than transporting and treating these flows at the treatment plant. And, there have apparently been significant advances over the past several years in correction techniques and their effectiveness.

The I&I program has created a market for—and stimulated advances in—more precise measurement and diagnostic devices, and technology for sewer system rehabilitation at significantly less cost and disruption than conventional means of replacement and repair. Commented Petroff concerning progress since 1973:

> There was no technology. EPA did not know what they were doing. We contractors did not know what we were doing. The consultants did not know what they were doing. I think back to some of the first or second jobs that our company performed, and by today's standards, they were not good at all. But a lot has changed within the last five years. You have new technology. You have new equipment, and most importantly, you have a lot of experience.

Added Will Naylor, a contractor representing the National Association of Sewer Service Companies:

> The I&I rehabilitation industry created by [Public Law] 92-500 is just now emerging. The job has been so complex that we are just about to realize what can be done. We now have competent and knowledgeable engineers with workable computer programs. Flow measurements have become reliable, fast and cost-effective. Sewer rehabilitation projects with new techniques have just gotten started. Industries are just starting to realize some return on innovative pipe restoration systems that require little or no excavations.

As a result, efforts to rehabilitate I&I in many instances, while still unable to attain the overly optimistic removals of 90 percent bandied about in the early days of this program have removed 40, 50 and even 70 percent of the infiltration in a number of situations.

Despite the apparent cost-effectiveness of removing excessive I&I, there have been proposals to eliminate this work from being eligible for federal assistance. Further, recent efforts by EPA have changed the nominal index of what constitutes "excessive I&I" to a value that would automatically reduce the stated amount in need of attention around the country. While this will make the problem appear smaller, it will do little to resolve it. This action will, however, ensure that in many instances, considerable quantities of fresh water will continue to be transported to plants for costly treatment

In contrast to this, some who opposed funding eligibility for I&I work continue to endorse the funding of advanced waste treatment facilities—a level of treatment and hence, expenditure that tends to be among the least cost-effective In fact, EPA's definition of secondary treatment, which was based on that level of treatment at which the greatest quantity of pollutants is removed for each dollar spent, essentially established the cost-ineffectiveness for these additional margins of treatment. The Subcommittee fails to see the rationality of maintaining the eligibility of federal funding for something that is by definition less cost-effective than secondary treatment, while excluding that which is demonstrably more cost-effective

V—Origin of the Problems

The problems of plant performance originate to varying degrees in the performance of all those involved in the regulation, funding, construction, equipment, operation and maintenance of wastewater treatment works. Fundamentally, problems are rooted in the ability of the various parties to do the best job possible and their incentive to do so.

The municipality—which selects the design engineer, applies for the construction grant, puts up some or all of the non-Federal share of the cost, takes title to the treatment works, levies the user fees, and operates and maintains the plant—must be responsible for its performance. Yet the evidence in the record indicates overwhelmingly that in far too many cases the municipalities lack the competence, the commitment or both. Thus the whole process of creating a treatment plant that works and assuring that it is run properly often depends heavily on the design engineer for technical skills and the regulatory authority of federal or State governments for setting out what must be done.

THE ABILITY TO PERFORM

Problems can occur regardless of the size of the community. Testified Adlene Harrison, who has served three terms as a local elected official in Dallas and three and a half years as Regional Administrator of EPA's Region VI:

> Unless the small and mid-sized communities exist in a State that has strong State government and resources such as California and Texas and a few others, they are usually totally incapable of making good decisions in terms of wastewater treatment. The community will call upon outside expertise and very seldom will know if they are being given good direction . . . The official will also fail to take into consideration that once a plant comes on line, if it does at all, the operation and maintenance is critical. Once again, a small or mid-size community cannot afford the expertise needed for the operation and maintenance * * * Even in the cases of large cities, there has been poor design work in cities like Detroit and Fort Worth.

Ms. Harrison charges that 30 to 40 percent of the waste in the program is attributable to faulty engineering. While not supporting this contention, Gibbs of the American Society of Civil Engineers—an outspoken defender of his profession—observed in testimony: "If you look at the proliferation of engineering firms since the start of the EPA program, you will find there is a tremendous increase in the total number of firms involved in this work. Some of those people came in with no experience whatsoever." In similar testimony, Carmen Guarino of the Water Pollution Control Federation agreed that "there are literally thousands of consulting firms doing this work," many of which have never done it before, typically in small towns inclined to hire local engineers to keep the money in the community.

According to John Smith of EPA's Cincinnati labs, there are now in use more than 120 separate technologies or unit processes, eight to twelve of which might be incorporated into a single wastewater treatment works: "Costs and energy effects of design of these systems now require much greater knowledge on the part of the design engineer

than in the past." Yet only 32 of these unit processes are covered by the so-called Ten State Standards, compiled by the Great Lakes Upper Mississippi River Board of State Sanitary Engineers; 58 are addressed by the manuals of practice of the Water Pollution Control Federation. Noting that these are the two more commonly cited design references in the profession, Smith observed:

> We are, therefore, faced with a significant design information gap on a large number of currently used municipal technologies, especially the process design type of information that is needed for the facility planning process. It is this point in the design process where the critical dollar decisions are made.

Agreed Tracy Greenlund, a consulting engineer from Pennsylvania, who has been designing systems for U.S. communities on the basis of European technology: "There are no American design standards for this [European] technology. The Ten State Standards that we talked about this morning or Pennsylvania sewerage manuals; they are totally inapplicable."

To remedy this deficiency, EPA, the American Society of Civil Engineers and the Water Pollution Control Federation have launched a joint project to develop up-to-date design information guides to upgrade the technical data available to the engineering profession at large.

What of the design review responsibility of EPA and the States which have taken over operation of the program under delegation? Testified EPA Administrator Gorsuch: "The agency and the States have been criticized for inadequate reviews of plans and specifications and the oversight of construction and project management activities. *Such reviews are often minimal and have not been as comprehensive as desired.*" (Emphasis added.) There is much additional evidence that this indeed is the case.

In fact, past oversight of this program by the subcommittee has documented that EPA and the States are often understaffed and unable to conduct substantive and timely reviews of project plans and specifications. Reviewers, often lacking knowledge or experience to make critical judgements as to the adequacy of costly project designs, have simply asked for more and more documentation or data to substantiate their decisions, and this in turn has often led to months of delay and higher costs due to inflation.

Yet despite all this reviewing and re-reviewing, critical errors can often go undetected. Noted EPA's Smith, when asked about this: "I will say that because of the level of detail involved, with hundreds of pages of plans and specifications, it is beyond the responsibility of the review authority to eliminate design deficiencies of the nature uncovered in our studies, for the most part."

Major municipal or metropolitan systems such as the larger Association of Metropolitan Sewerage Agencies (AMSA) members which have extensive engineering staffs, regard design review at higher levels of government as useless. For example, St. Louis' Metropolitan Sanitary District, or that of Chicago, will have three or four times the staff of an EPA Regional Office. Former EPA Regional Administrator Harrison conceded that chronically underfunded and understaffed EPA offices don't do a good job of catching design errors. And in his testimony regarding Detroit, Moore emphasized that everything done leading to the "horror stories" he described "has been

done with the full concurrence of the State agency and the Environmental Protection Agency."

These problems are compounded by another factor, according to Dr. Cecil Lue-Hing, Director of Research and Development for the Metropolitan Sanitary District of Greater Chicago appearing as a witness for AMSA:

> The mechanisms available to assist municipalities in deciding which processes or systems to utilize in either expanding existing plants or design and constructing new facilities are not always satisfactory because they do not properly address urgent, current problems.

These mechanisms include a reliance upon manufacturers' claims for processes and equipment, experience gained from other facilities, the results of limited pilot testing, and occasionally recommendations from regulatory agencies. Among "serious deficiencies" he enumerated: "Manufacturers' claims are not always valid and are usually overexpressed." Subsequently asked about this assertion, Donn Dresselhuys, President, Autotrol Corporation of Milwaukee, commented: "I will accept that. That can happen * * * I think we are capable of exaggeration. We all are as corporate individuals and as human individuals." In fairness, it should be noted that Smith of EPA testified that the manufacturers of one particular process known as rotating biological contactors, which Autotrol produces, are scrupulous in meeting their warranty obligations and pursuing a program of equipment improvement based on performance information.

Other deficiencies listed by Lue-Hing included the limited availability of experience with new systems and processes, inadequate operational results from small-scale pilot plant evaluations, and unreliability of cost analyses for construction and operation of some new systems. The record also shows that it is difficult for a community contemplating construction or upgrading a wastewater treatment works (or that community's consultant) to obtain information on precisely what processes and equipment are in use at various locations around the country. Thus the Subcommittee questions whether this country's water pollution control "industry" in the broadest sense, including government at all levels and all the private components, has a reliable and systematic means of delivering the right technology to the right plant to produce the right results.

"TWO OR EQUAL," AGAIN

Also constraining the ability of the system to produce the best projects possible is the provision found in section 204(a) (6) of the Act requiring that bid specifications, if they name brand or trade names, list at least two such names and use the words "or equal." To the knowledge of the Subcommittee and EPA witnesses, this provision is unique to this program and found nowhere else in Federal procurement policy. And the record is clear that it works to the detriment of the program by discouraging innovation on the part of equipment manufacturers in the development of superior components and processes, and by fostering use of those which are inferior or the work of manufacturers and suppliers with no prior experience. As one manufacturer put it: "Obviously, this works against the supplier who has proprietary or unique processes or equipment for which

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there is no equal. It is contrary to innovation or the acceptance of new processes or equipment."

Another problem stems from the fact that a manufacturer who has not made the named piece of equipment under EPA regulations, can merely furnish a bond and qualify as a supplier. The result can be extensive justification, a protracted bid protest, or equipment that fails. Noted one consulting engineer:

> It goes deeper than just the "or equal" question. In a traditional construction project, if we are working for a municipality on a project such as a water plant, the determination of whether it is equal or not is the engineer's; he decides if it is satisfactory or not. The burden of proof was on the equipment supplier to prove that it was equal. In the EPA game, the way it got turned around, it becomes the engineer's responsibility to prove that it was not equal. In fact, if the guy could put up the bond for a piece of equipment, you became obliged to take it whether you thought it would work or not.

Under EPA regulation, one alternative to the "two or equal" requirement and performance bond is the use of "sole-source" procurement procedures. However, this also has been found wanting due to the excessive requirements involved. Noted EPA Administrator Gorsuch:

> [R]egulations permit sole-source procurement for equipment under certain very restrictive and exceptional circumstances. However, the conditions which must be met to justify sole-source procurement are so restrictive that it is rarely practiced.

As if to verify the Administrator's comments, a consultant who sought permission to go sole-source procurement on an innovative project recalled: "It took a lot of work and it took a lot of time, but it got done. We could not afford to do that on every project, but there is a way around it [two brands or equal]; it is just extremely complex."

Dresselhuys of Autotrol discussed a sole-source procurement that ultimately was approved.

> [I]t was tied [up] to a year in the EPA office waiting for judgment and determination. The municipality was tied up a year; the consulting engineer missed his cash flow for a year and the consultant would come back and say, "We cannot afford [this] whatever the merits of the program are; the fact of the matter is, I cannot afford to have no cash flowing on this job. What do I do with my people?" So they say nuts to it, it is not worth it.

And, as to what can happen when the sole-source route is not used, Charles Kaiser of St. Louis testified:

> I think when you tell us to build a treatment plant, we are going to put in $25 million worth of incinerators and we want to have someone design and build those incinerators that has built one before, and you say, "Oh, no. You have to let anybody bid it that wants to bid it, if he says he will do it." Well, I am happy to tell you we did just that after protest. The incinerator manufacturer bid $5 million low on $25 million worth of incinerators, and he has just taken chapter 11 [bankruptcy].

Willian H. McCombs, a consulting engineer from Duluth, told of an engineer in that city which had specified a very sophisticated sludge drying-combination garbage incineration process around one manufacturer's product. "He was forced to take another manufacturer under the 'or equal' provisions, and the plant was completed several years ago and it is still not operating. I understand that the incinerator is being torn out and rebuilt and it will be another two years before it will be ready."

THE INCENTIVE TO PERFORM

No large-scale and complex undertaking can be expected to enlist the best efforts of a multiciplicity of "players" automatically; there must be incentives. When several industries and professions are involved, these incentives normally take the form of the usual lines of accountability and responsibility arising from the relationship between the client and the provider of goods and services. Unsatisfactory performance jeopardizes repeat business with the original client and—by loss of reputation—business with others, and risks court action for recovery of damages. In the case of municipalities building or operating physical facilities, the traditional sanctions include withholding of funding assistance, and civil and criminal penalties. The record demonstrates, however, that neither accountability nor enforcement has worked with much success in the Construction Grants Program.

Accountability

GAO, in its November 1980 report to the subcommittee, stated the case succinctly:

> The question of accountability and or responsibility for fixing wastewater treatment plants that have seldom or never performed as efficiently as they were designed to be is a tangled web of charges, counter-charges, innuendos, and finger-pointing by the various parties involved in plant construction. Included in this group are EPA, State, local, and industrial officials, design engineers; equipment manufacturers; and finally, the construction contractors and subcontractors.
>
> Even when the potential exists to legally resolve the accountability and/or responsibility issue and hold another party responsible for correcting plant problems, EPA has not encouraged the grantees to take action or become legally involved. The bottom line generally reads: Federal and State Governments spend million of dollars to fix the same treatment plants they originally spent millions to construct.

Part of the problem stems from the fact, as noted earlier in this report, that poor performance of a given treatment works normally is accounted for by a combination of causes. But that is not the sole source of the problem, as noted by Smith of EPA and his associates:

> The engineering design community and equipment manufacturers and suppliers take key roles in the pollution control effort. Yet in providing their services they are not held responsible for the decisions they make and the design of facilities, for the reliability and operability of the facilities or equipment they furnish, nor for the information they disseminate to plant administrators and operations personel. As a result, the local community is put in the untenable position of spending a lot of money for a treatment plant that may be poorly designed or is incapable of being operated properly. *There will be no improvements in the situation until consultants and equipment suppliers are held responsible for their products, the decisions they make, and the actions they take.* (Emphasis added.)

Not that the EPA and the States are blameless. In fact, consulting engineers that undertake the design of a treatment works for a municipality involved in the EPA grants program, on behalf of their clients, the grantees, lose considerable control over many of the key factors that are critical to their ability to determine just what is to be designed.

In a non-EPA-funded municipal or industrial project, such things as the source of funds, the scope of the work or project, and schedules of payments and the budgeting of funds to make those payments are under the control of the owner, or client. Yet, when it comes to EPA

grants-assisted wastewater treatment projects, these conditions are rarely present, and limit much, if not all of the control over the final nature of the project by the design engineer. Noted the former head of a large municipal system:

> I think experience has shown that you have a very difficult time fixing responsibility, because you go from the design person to the man who built it, and then the man who built it to the people who supplied the equipment. So, the track record has been that it is kind of hard in the final analysis, in court, to hold a designer responsible for the operation of a plant because there are so many other factors involved.

In addition, the "two or equal" clause in the procurement requirement of the Act that was previously mentioned, because of the way it has been implemented, also serves to reduce the control exercised by the municipality and its consulting engineer, further diluting their accountability for performance.

Added another consulting engineer with respect to regulatory influence: "I might say, as far as design is concerned, the engineer gets an awful lot of inputs from the State regulatory agencies * * * You also get a lot of assistance in design, not necessarily welcome assistance, from EPA, who are not the most qualified people in the world." This influence doesn't necessarily make it possible to document problems attributable to the States or EPA, as noted by Detroit's Joe Moore:

> I frankly don't think the regulatory agencies make that significant a change in the design specifications. What they do is, they harass you long before you ever submit the plans and specifications so that they have gotten their ideas into the design which then bears the engineer's name * * * *They will write you letters or call you on the telephone and say, "We won't do this until" and you better start writing, because they are about to give you a condition you have to meet before you can get something approved—undocumented, obviously.* (Emphasis added.)

The reasons why these reviews tend to accomplish so little, or why there is this tendency to rely on the sanction of threatening to withhold grant funds unless changes are made has been touched on earlier: EPA and the State agencies tend to lack an adequate career corps of seasoned professionals for reviewing these projects.

These same individuals are also frequently called upon to move and approve hundreds of projects within short time periods in order to obligate federal grant funds before they expire, further limiting their ability to closely review projects. Recalling the successful effort to approve $9 billion in projects in 18 months when the Supreme Court overruled the President's impoundment of those funds,[8] Detroit's Joe Moore commented: "[It] merely proves that when you wish to streamline the process, or override red tape, it can be done." However, many including EPA believe these types of pressures, plus the grant review and approval process in general, do little to ensure that the best possible project is being funded.

In her testimony before the Subcommittee, Administrator Gorsuch focused primarily on the aspect of the problem stemming from the diffusion of responsibility: "I think the current system was designed not to work, where everybody is responsible for everything." And

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[8] During the first three years of the program, President Nixon impounded a total of $9 billion of the $18 billion in contract authority authorized for this program. Litigation over these actions eventually resulted in a ruling by the Supreme Court in 1975 that the impoundment was illegal, and that the funds must be allotted to the several States for obligation.

while the EPA Deputy Administrator, John Hernandez, disputed the notion that EPA lacks the capability to review plant design, he did endorse a backing off by the EPA and the states as well. Noted Hernandez: ". . . we are taking over a part of the responsibility of the consulting engineer, making it impossible for him to function in an effective way when we assert our will on him. That is done at the State and federal level." And a top agency staff member added, "I feel strongly, when you continue to have duplicate reviews, that it is easy to pass the buck and then no one is quite responsible for it."

An EPA solution to these problems is to delegate more of the program's management to the State water pollution control agencies, thereby eliminating much of the duplication and addressing some of the accountability problem. However, EPA, which by law still remains responsible for ensuring compliance with the clean water law and with 54 other federal statutes and executive orders, may lack the resources to adequately monitor the results of its increased emphasis and reliance on State certification. If this is the case today, it will hardly be remedied by announced reductions in agency staff. This is discussed in considerably more detail in chapter VI.

The GAO, in its November 1980 report on treatment plant performance, suggested three approaches for addressing the accountability problem: (1) the use of "turnkey" contracting whereby one party, by contract, is made totally responsible for the planning, design, construction and ultimate performance of the treatment works; (2) making the EPA and/or the States a party to all contracts, thereby eliminating any ambiguity as to their responsibilities; or (3), having the State and/or EPA function as an advisor (as opposed to adversary in the current regulatory nature of the program) to the grantee.

Of these three, the latter two already exist in varying degrees. Some States and EPA regions provide varying amounts of assistance to grantees ranging from the selection of design engineers to the provision of technical assistance, particularly in cases involving small communities that are seeking alternative approaches for addressing their clean-up problems. Others provide far more, as in the case in New Hampshire.

Under authority of State law, the New Hampshire agency prequalifies various engineering firms as being eligible for selection by communities applying for EPA and State construction grants assistance. The qualification process, which is performed by a 13-member commission, evaluates a firm's ability to do sewer, wastewater, or drinking water plant design and other related work. Once qualified, a firm is placed on the State's master list from which it can be selected by a municipality.

An additional feature of the State's program is the authority for the State to be made party to the contract between the engineering firm and the community. As to how well it works, commented Collins of the State agency: "It has worked quite well and we consider that it has kept them [the consultants] honest."

Over all, the one proposal that seemed to spark both the most controversy and the most interest was the use of "turnkey" contracting. Some contractors and engineering consultants see it as creating more problems than it solves, or disrupting traditional roles and

responsibilities of one party to another and would prefer to avoid this approach. Yet a variant of the turnkey approach is already applied in the case of operations consultants who, under contract to a municipality, obligate themselves to turn around poorly performing plants and to meet discharge permit requirements within a specified time and within a prescribed budget.

In contrast, however, is the strong support of equipment manufacturers, or process engineering firms as they are sometimes called, who frequently use turnkey contracting in providing their services to industry. Noting that this procedure has recently enabled his company to design, construct and start up an industrial sludge treatment plant in nine months, Dr. Gerald H. Teletzke, President of Zimpro Environmental Group, noted that this type of effort, done for a municipal client under the EPA Construction Grants Program "would normally require a minimum of two and a half years, and up to six years to complete." Added Teletzke: "This contract, incidentally, included a provision for a bonus if the project was finished ahead of schedule. Incentives do help."

Further endorsing the use of a turnkey approach was the Water Pollution Control Federation's President Carmen Guarino:

> The turnkey concept has some very attractive features. For example, when I was Commissioner of the Philadelphia Water Department, I would hire one person and say "Look, you have got to meet these specs, and when the smoke clears, I want a plant that has been operated for two years, meets the specification and has trained people, or you will not receive your last 15 percent." I think if we did that, we would wind up with plants that are better and that would work, because you have an incentive to do it and you only have one person to deal with. But when something goes wrong in a treatment plant and you go to the contractor and say, "Well, this is not right," he says, "Do not blame me; blame the design man."

Others, however, believe that the best incentive to ensure that a plant is properly designed, constructed, and able to meet its performance expectations long after everyone—the contractors, the equipment suppliers, and others—has left the site, is to extend the liability of one of the parties, and the one who seems to be highest on everyone's list is the "design man."

Noting that he had provided some comment on a one-time Senate proposal, since abandoned, that design engineers be held liable for a period of two years after a facility is constructed, Detroit's Joe Moore commented:

> I felt they should be held liable, regardless of how they wish to discharge that liability for at least two years, and, it could be by insurance in the nature of malpractice insurance in the medical profession or malpractice in the legal profession. Of course, engineers will say that is enormously expensive. My answer is, it is enormously expensive to have plants all over the country that do not meet what is expected of them or expected in the design specifications or the expectations of the peoples who funded them.

Others who testified before the Subcommittee generally echoed the need for this extended period of liability for the consultant, in some instances suggesting that a period of one to five years should be considered. Yet without addressing the problems that stem from the multiple involvement of the State, EPA, and others, this approach would seem of questionable merit. This is also true of the current Senate Bill, S. 1716 [9] which has abandoned the strict consultant

[9] Reference is made here to S. 1716 as it was passed by the Senate on Oct. 27, 1981.

liability approach in favor of keeping the consultant under contract for an additional year to help in training plant personnel and in managing the facility, the costs of which would continue to be grant eligible. Neither, unfortunately, seems to resolve the fundamental issue of who should be held accountable for the performance of a plant under the existing multi-party process.

One method, which appears to provide some incentive for ensuring that treatment works are constructed so they can be properly operated and meet their performance or design requirements, is a unique reimbursement program used by New Hampshire.

The State ultimately provides 20 percent of the costs of constructing a facility, but the applicant community bonds itself for the entire 25 percent non-federal share of project cost. The State reimburses a community over the life of the bonds that the community issues to raise this capital initially. In any given year that the facility fails to perform, the reimbursement payment is withheld. Further, because this process adds to the local costs due to the payment of interest on the municipal bonds, the State reimburses the community for this as well. As to how it works? Not badly, according to New Hampshire's Collins:

> Funds have actually been withheld from one city and two towns for improper operation. The city was allowing a pumping station to overflow because they did not properly maintain their standby generator. Upon withholding the payment for one month, the generator was repaired and has properly operated since that time. * * * Numerous other municipalities have been notified that their payments would be withheld provided they did not complete certain equipment repairs or maintenance procedures. Without the payment actually being withheld, these communities promptly corrected their deficiencies.

The use of this type of approach would also seem to provide at least a partial answer to the problem of what to do when communities, such as Atlanta, simply fail to properly operate and maintain their federally funded works, an issue discussed more fully in a succeeding section entitled, "The Responsible Grantee."

The Federal share—rewarding the recalcitrant

Since the first municipal wastewater treatment facility construction grants assistance program was enacted by Congress in 1956, providing 30 percent grants up to a maximum of $250,000 per project, the Federal share has gradually increased. In 1965, the federal share was increased to a maximum of 55 percent, and in 1972, it was changed to a flat grant of 75 percent. In 1977, the federal clean water law was further amended, providing grants of up to 85 percent of the costs for projects using innovative and alternative technology,[10] while retaining the base of 75 percent grants for all other projects. The effect of this trend, in the opinion of many, has been to reward those who choose to wait, or delay their efforts to comply with the law's clean-up requirements.

Some witnesses appearing before the Subcommittee continue to support the current 75 percent federal share of project costs, arguing that reductions in this level of federal assistance would be counterproductive, and for some, make compliance with clean-up requirements extremely difficult, particularly when coupled with the effects of inflation and the other reductions in State and local aid that are

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[10] Under the 1977 amendment, 2 percent of fiscal year 1979 and 1980 funds, and 3 percent of fiscal year 1981 funds are to be set aside for making the 10 percent add-on grant to qualified projects. In practice, this has tended to limit the total number of projects that could actually receive this higher grant percentage.

occurring or being contemplated. Noted J. Taylor Banks, Senior Staff Attorney of the Natural Resources Defense Council:

> There is no guarantee that States and communities will be able to make up the difference or that they will be willing to do so. As the overall competition for State and local dollars becomes tougher, the erosion of the federal commitment to this program may well make treatment projects unattractive, or, in fact, impossible, particularly in small communities.

Many others disagree, however, holding that the high level of federal subsidy creates an atmosphere of waste and abuse, and undermines concern about accountability. Noted Detroit's Joe Moore: "Well, I personally think that some of the difficulties that we have encountered in the Construction Grants Program arose when the federal percentage went from a maximum of 55 to 75 percent. Somehow or other, we think that is not our money." Added former EPA Regional Administrator Adlene Harrison: "Somehow all of us are more careful with our own dollars than we are with someone else's."

In addition to "rewarding the recalcitrant," the current grant program also fails to recognize the difference between "cost" and "affordability," lending a degree of credence to NRDC's Banks' concern about the ability of small communities to afford required treatment works.

Presently, a community's (and the nation's) "needs" reflect the estimated costs for constructing whatever amount (capacity) and degree of treatment (secondary, AST, AWT) that may be deemed necessary by State and EPA officials. In a large city, this may be tens or hundreds of millions of dollars. Yet on a per capita, or more importantly, on a per household basis, a costly project for a large city may only cost a few additional pennies or dollars per month.

For example, in Atlanta, it will cost $50 million to upgrade the city's R. M. Clayton treatment plant pursuant to State and EPA requirements. Yet, after the EPA grant, this will cost only 67 cents per household per month. Added to a $10 per month current cost, this will be very "affordable" to most, if not all, area residents.

In contrast, a "less costly" project for a small community may be virtually unaffordable. Consider, for example, the plight of a small New Hampshire community whose 750 residents face a $24 a month charge for their sewer service, despite federal and State grants which covered 95 percent of their construction cost.

In part, this disparity results from the economy of scale present in a large system, and the lack of it in a small community. However, there are other factors that affect these costs, most notably the environmental sensitivity of a community's location and the resulting degree of treatment that may be required.

Many of the nation's small and mid-sized communities are located in headwaters areas or on the shores of small and therefore more ecologically fragile lakes, streams, and rivers. As a result, these smaller communities are often subject to tighter and more costly clean-up requirements. Yet, under the current program, the small community's grant share does not increase, nor does its priority for a grant, due to the relative "smallness" of its project's cost in comparison to that of a large urban area's project, unless there are notably severe public health or nuisance conditions.

Until such time as this cost-burden "inequality" characteristic of the program is addressed, residents of small communities will have to pay a greater share of their personal income for cleanup costs than those in larger areas.

Not everyone agrees that this is a "problem" or true inequity. Noted Roger Kanerva, manager of Illinios' State EPA's environmental program's operation:

> [The] thing you have to take into account is that there are economies in scale in wastewater treatment. I do not view that as creating social inequity, necessarily. It is just a fact of sizes of facilities, and once you get a certain size in, you just get those economies of scale available. You could turn that around and say that there are a lot of complex social problems that the urban communities have to cope with that the rural folks do not have . . . So, maybe in the long run, you have got to look at these things balancing out.

Beyond these differences, however, there are other effects that must be considered when viewing the merits of the uniformity and degree of federal subsidy.

For example, the effectively higher subsidy that urban residents receive under the current program, as compared to those in less developed or rural areas, also tends to encourage flat, as opposed to progressive, water use rate structures, and deferred maintenance programs. Nor does the continued existence of a high federal subsidy encourage the development of sinking funds for the eventual replacement of the wastewater collection and treatment capital infrastructure that is now being built at a rate of billions of dollars a year.

Left unchanged, the Construction Grants Program's flat 75 percent grant may produce a long-term situation in which one can envision a perpetual public demand for federal water pollution control assistance. This is already occurring in the highway and mass transit areas. If this situation is to be turned around, there must be an end to both excessive dependence on federal grant subsidy, and also from the inequities that fixed or uniform assistance levels tend to create.

One way of tempering the affordability problem would be to set the amount of grant assistance at that amount necessary to keep the total annual, per-household cost for water pollution and O&M expenditures at no more than some percentage of an area's median household income. This approach has been used in the Farmers Home Administration's water and sewer grant and loan programs, and as a trigger for requiring further consideration of less costly solutions under the EPA-grant program. Reportedly, some European countries also use this type of an approach for their public works assistance programs as well, apparently with some success.

Others have proposed to eliminate all funding for future growth, or "reserve capacity," at least so far as federal assistance is concerned. This type of action, it is argued, would force local communities to come to grips with real costs, as opposed to federally subsidized costs, and would likely result in more realistic and affordable solutions. Still others such as the Administration in its current proposals to Congress, suggest the current 75 percent grant share be retained, but that categories of eligibility such as collector sewers, combined

storm-sanitary sewers, and collection system rehabilitation be eliminated. Unfortunately, this latter suggestion, while limiting the federal exposure for this program, tends to arbitrarily decide which communities will receive federal aid under this program no matter what their problems may be.

Over all, the record of problems affecting the program reflects an attitude toward the federal dollar that leaves no doubt that the 75 percent grant has led to a diminished sense of stewardship over this "free" money. Noted the Conservation Foundation's Senior Associate, Ms. Clem Rastatter: "I believe that a shift in financial responsibility away from the Federal Government, if properly managed, could help avoid the overdesigned, high-cost, and unreliable systems which are now troubling so many communities." And in this, the subcommittee concurs.

While a reduction in the federal share seems most appropriate, it must be done in a manner taking into account the program in progress. Indeed, if the record has indicated anything, it is that changes be gradual; any changes in the federal share, or eligibilities for that matter, should be phased in over a period of years, to avoid massive disruption, delay, and waste due to inflation.

Effluent limitations and permit requirements

The 1972 Act prescribed secondary treatment as the national minimum required for all municipalities, but left to the discretion of EPA the definition of secondary and thus, the degree of treatment to be provided. While the law gave EPA some latitude in setting secondary treatment requirements, the agency chose not to use it, issuing instead one narrow and uniform set of requirements limiting discharges to a maximum of 30 parts per million each of biochemical oxygen demand and total suspended solids, and requiring that secondary treatment technologies remove 85 percent of the pollutants entering the plant, on a monthly average basis.

The uniform effluent limitation for secondary treatment in combination with EPA's reliance on them as a regulatory standard, has contributed to the design and construction of sophisticated and costly plants. This in turn has given rise to complaints of over-design and the need to upgrade or replace plants employing simpler processes that could not meet the new performance requirements, even though these plants were operating well in terms of achieving their original design performance levels. Further, the lack of time and adequate personnel during the early years of the program did little to help avoid this problem.

The 1972 law gave the EPA 26 months to develop standards for secondary treatment and issue more than 20,000 municipal discharge permits containing those standards and schedules for meeting them. Unfortunately, it took the EPA 10 months just to develop the secondary treatment definition, leaving both federal and State regulatory officials in a mad scramble to issue the required permits and to begin reviewing and approving municipal applications for construction grants.

As a result, many if not most of the first round of municipal permits were simply pieces of paper inscribed with the EPA definition of secondary treatment, the law's July 1, 1977 compliance deadline substituting for a realistic schedule of compliance. Efforts to inspect

and evaluate a plant's capability to meet the new secondary treatment requirement or to determine just how long it would take to construct necessary facilities were the exception rather than the rule. And in those few instances where efforts were made, they were often perfunctory in nature due to the lack of knowledge on the part of EPA or State personnel about treatment plant technology or construction. The comments of the Water Pollution Control Federation's President, Carmen Guarino described what was believed typical at the time:

> Early in the game when we were trying to set schedules, I visited the regulator who was concerned with setting the time that it takes to build a treatment plant. He said to me, "Carmen, how long is it going to take you to build that treatment plant?" I said, "It is going to take at least five years." He said, "Oh, come on; it will not take five years. I have a friend in the construction business; I am going to call him and ask him how long it would take to build a treatment plant." He picked up the phone in my presence and called the contractor. He said, "Hey, Joe, how long do you think it would take to build one of those plants in Philadelphia? I think it would take two years. Do you agree with me?" The fellow said, "Yes, I think it would take two years." He said, "Carmen, you have got two years to build that treatment plant." That official's decision cost Philadelphia half a million dollars in lawsuits, consent decrees, and everything else.

The EPA definition of secondary also frequently imposed higher capital and operating costs on grantees, many of them small communities and sanitation districts, resulting from the more sophisticated technologies needed to meet the new standard and a need for higher plant operating skills and management capabilities.

Generally, these situations stem from the fact that while the definition of secondary treatment is narrow and uniform, water quality conditions and the amounts of wastes dumped into any given body of water are not. Naturally occurring differences in a stream flow, mineral content, temperature, and other factors affect its "assimilative capacity," its ability to absorb wastes. Consequently, while secondary treatment, as defined, may be appropriate for some situations, it is inevitably either too much or too little for many others.

The Act and EPA give recognition to these factors, but only in terms of upward adjustments. If secondary treatment is inadequate to protect water quality, higher levels of treatment are required. But in cases where secondary is excessive and yields no benefit, there can be no adjustment downward.[11] This in effect, has led to costly treatment for treatment's sake, absorbing funds which could be used elsewhere to greater environmental benefit.

According to unpublished EPA data, more than $1 billion (in 1980 dollars) could be saved in the future simply by broadening the existing definition of secondary treatment to allow the use of alternative, less-costly forms of treatment which, while unable to meet the current definition's performance requirement, can provide enough treatment so as not to tax a stream's assimilative capacity.[12] Although

[11] EPA's regulations allow for secondary treatment requirements to be exceeded, i.e., relaxed, in certain limited situations, such as when high volumes of industrial wastes are discharged into a municipal system, these wastes usually being significantly stronger than normal domestic sewage. However, the agency has only recently, in its current round of re-issuing expiring municipal discharge permits, begun to make any real use of this variance.

[12] Prior to the enactment of the 1972 Federal Water Pollution Control Act Amendments, which set out the technology based requirement that all communities have, as a minimum, secondary treatment, municipal (and industrial) treatment requirements were generally established on the basis of assessing a stream's assimilative capacity. Unfortunately, this water quality-based approach was, and still is, too vague and subject to analytical weaknesses. This makes it difficult if not impossible to establish any correlation between a stream's actual water quality conditions and the presence of a discharge. As a result, many communities and industries found it easy to argue successfully that they were not the cause of observed water quality problems, and thereby avoided the costs of providing wastewater treatment.

water quality analytical tools are still inadequate as the sole determinant of treatment requirements, many believe that the savings that can be realized by allowing some judgment to be used in determining which type or level of secondary treatment is necessary justify any risks involved. And, should a lesser level of treatment prove inadequate, more can always be added.

Enforcement

The fact that a vast majority of treatment works do the job they were intended to do, or come close to meeting their permit requirements, confirms that water pollution control was not simply an objective imposed from on high by the national legislature; good-faith efforts are reflected in success stories in the Wilmingtons, the communities in New Hampshire and Illinois and California and other States cited in the record. But then there are the Atlantas, the Detroits and other communities where enforcement has been the only way to prompt compliance with local responsibilities under the Act.

With respect to Detroit, the City's Assistant Administrator for Wastewater Treatment, Joe Moore, was asked for an explanation of the City's reluctance to move ahead. He responded: "At the risk of pointing the finger at people no longer responsible for the operation, first off I do not think those in charge of the Detroit Water and Sewage Department at the time of the passage of the 1972 Act believed it would ever be enforced and, therefore, they didn't start." And in the case of Atlanta, J. Leonard Ledbetter, Director of the Environmental Protection Division, Georgia Department of Natural Resources, volunteered the comment that, in the clear light of hindsight, the State has been "too reasonable with the City of Atlanta. I think we have allowed too much time. . . .We have been too fair. . . " Referring to a State mandate that the City bring in a consultant to diagnose its O&M problems and comply with the findings at local expense, Ledbetter continued:

> Now, we went forward in good faith with the city through those years they were having operational problems. Had we known in advance the end result, we obviously would have required the city to have brought in the operations consultants much earlier and proceeded from that point.

The record also makes clear that the reasons for poor municipal performance stem from a number of causes. Former Regional Administrator Harrison put it this way:

> First of all, the average elected official knows very little about this sort of thing, wastewater, water quality and so forth, and I think when you go over a city budget as I did many times, it took me quite a long time to realize why staff would be fighting for more money to do that kind of job better for the community . . . [I]t is not high on the totem pole of priorities.

An operations consultant noted that municipal officials who are responsible for sewage treatment plant performance have no economic incentive for doing their job well unless there is a strong "fiscal" incentive resulting from a substantive enforcement program. Another witness noted that managers have to adopt a hiring strategy that works against improved O&M: "They have to look at a vacancy and say, 'What is the least I can pay to fill this job?' " And Kaiser of St. Louis attributed low priority to the mentality reflected in the comment often made by poorly informed officials and citizens alike

when considering the costs of municipal wastewater treatment: "Oh, I can understand that we need good people in the electric plant. But that is a sewer plant; what is it? You know what you handle. It is so simple."

Several witnesses concurred in an observation by Georgia's Ledbetter that enforcement is no easy task. Often a fine merely shifts funds from one level of government to another without solving the problem; it may even reduce the municipality's fiscal ability to make the expenditures needed to improve a plant. A sewer connection moratorium can be effective in the case of a municipality seeking to grow. But, as in the case of Atlanta, the growing portions of the metropolitan area served by the city's plant can lie outside of the recalcitrant city's jurisdiction; the sanctions represented by a moratorium of this nature thus are not directed against the offending jurisdiction.

Whatever the problems, enforcement has not been resorted to in the majority of cases. EPA concedes that in the past, the bulk of enforcement efforts have been targeted against industry rather than municipalities. As to the consequences: "Lack of aggressive federal enforcement against municipal dischargers has failed to provide needed local government incentive for consistently meeting effluent permit requirements," according to Smith et al of EPA. The same concern was reflected in Administrator Gorsuch's testimony that: "Now it is time for EPA to focus its water enforcement efforts on municipal facilities," an admonition made by Mrs. Gorsuch's two predecessors, Douglas M. Costle and Russell E. Train, to little avail. The Subcommittee remains skeptical.

Responsible grantee

Section 204(b)(1)(C) of Public Law 92–500 prohibits the Administrator from approving a grant unless he determines that the applicant has the "legal, institutional, managerial, and financial capability to insure adequate construction, operation, and maintenance of treatment works throughout the applicant's jurisdiction . . ."

EPA regulations, at 40 CFR 30.340.1, establish the following as general agency policy:

> The award of grants to applicants who are not responsible is a disservice to the public, which is entitled to receive full benefit from the award of grants for the protection and enhancement of the environment. It frequently is inequitable to the applicants themselves, who may suffer hardship, sometimes even financial failure, as a result of inability to meet grant or project requirements. Moreover, such awards are unfair to other competing applicants capable of performance, and may discourage them from applying for future grants. It is essential, therefore, that precautions be taken to award grants only to reliable and capable applicants who can reasonably be expected to comply with grant and project requirements.

The regulations further prescribe, in section 30.340–2, that to qualify as responsible, an applicant must, among other things: "(c) Have a satisfactory record of integrity, judgment, and *performance, including in particular, any prior performance upon grants and contracts from the Federal Government.*" (Emphasis added.)

The Subcommittee finds that this policy is both sound and in conformity with the statute, and practically a dead letter as it relates to the issue of prior performance. It has been virtually ignored in the past, as Moore testified was the case in Detroit when grants

were awarded against a background of poor operation and maintenance. And the Subcommittee concludes that the same was true of awards to Atlanta before recent improvements were instituted.

The fact that this set of requirements has rarely been enforced also reflects to some extent some of the "real world" influences in a federally funded grant program. As expressed by former EPA Regional Administrator Harrison:

> I don't think any Congressman or any Senator would probably tolerate for too long any one regional administrator saying: I am cutting your city off and that is it, and they are blatant here and so forth, without proving to that elected official that at least you tried to work with that client. I think it was my responsibility to try to do that work. * * * [Y]ou have to hope if you work with them long enough, and they need the [treatment] system—you already know they need the system, so you knock yourself out trying to work with them until finally you get a fairly good performance out of them.

As to the future, EPA was asked how it assures compliance with the responsible grantee requirement and responded that they are "presumed" to be responsible under 40 CFR 30.340–3, which states:

> Submission of a grant application shall constitute an applicant's assurance that he can and will meet the standards set forth in § 30.340–2. An applicant may be presumed to be responsible in the absence of any question as to his ability to meet the standards.

The agency also argued that it is general federal policy that State and local governments are competent to administer federal grant programs with minimum oversight, and that additional review to determine grantee responsibility prior to grant award would add red tape and delay the grant. Further, grantees are thoroughly advised of their responsibilities under the program, assistance is provided by EPA, States and the Corps of Engineers, and training of grantees in grants management is eligible for funding.

Nothing in the argument, however, is responsive to the issue of whether federal grants should be made to applicants whose O&M record at the time is so blatantly poor as to have generated enforcement actions.

Resistance to change

For years, there has been a reluctance among design engineers, and the applicant communities they serve, to venture into relatively untried technologies that might yield better performance. Perhaps because of the potential for performance problems of the sort highlighted during the hearings, consultants understandably tend to favor the tested, tried and familiar. And given the cost of the facilities involved, municipal governments are similarly moved to caution rather than risk costly and politically embarrassing failures. Commented Dr. Lue-Hing, of Chicago's Metropolitan Sanitary District:

> Since municipal agencies cannot request funding from their constituents twice for the same public works projects, there is naturally much reluctance by local agencies to risk the consequences of purchasing or installing expensive new technologies which do not perform in accordance with expectations.

Simple confidence in what is often proposed can be another major determinant of a community's willingness to try something new, and to risk making a change. Consultant Tracy Greenlund, in his testimony before the subcommittee, recalled proposing to a mu-

nicipality an innovative process which promised better performance at lower cost than conventional technology. At the conclusion of his presentation, a member of the municipal agency flatly told him: "You will pardon me if I say to you that I just do not believe a word you said."

It was precisely this situation that prompted the Congress to enact the innovative and alternative (I&A) technology provisions of the 1977 Act discussed in the next section of this report. Yet, when the first projects were proposed for funding under the I&A amendment, Smith and his associates, evaluating proposals for EPA, found that fully 42.9 percent of the projects would employ fully known processes long in use.

The Subcommittee concludes that resistance to change and to the use of innovative technologies remains strong in the water pollution control community, and little progress in this direction can be expected absent adequate incentives. Noted the Natural Resources Defense Council's J. Taylor Banks:

> I concur that these incentives [for innovative and alternative treatment] ought to remain, and I concur particularly that EPA ought to be performing the cost effectiveness analysis rigorously on all projects. The I & A program can be made to work, not only as an incentive, but as a requirement that these kinds of technologies receive full consideration. The problem with that is, it seems to me, as much institutional as anything else. We talk about an entrenched engineering mentality among the consulting firms in this country that work on these kinds of projects. I think you will find the same sort of entrenched mentality in the regulators and the EPA grants people who operate this program. If there is any way to change the requirements of the law to require a more vigorous cost effectiveness analysis to push those bureaucrats in that direction, I recommend that it be explored.

VI—Implementing the 1977 Amendments to the Construction Grants Program

Innovative and alternative technology

When the House was debating the Conference Report on the 1977 Act, a joint statement by the Chairman and Ranking Minority Member of the Subcommittee on Water Resources took note of resistance on the part of EPA, the engineering community, State and local governments and the private sector to innovation called for in the 1972 Act. "The conferees recognize the problems of inertia and the tendency to cling to the tried-and-true and to avoid risks," said the floor manager in 1977, "and accordingly have structured a comprehensive set of amendments to overcome them."

Highlights of those provisions include a set-aside of 2 percent of each State's allotment in fiscal years 1979 and 1980 and 3 percent in fiscal year 1981, to be used to increase the federal share of innovative and alternative project costs to 85 percent, in effect a 10 percent bonus. In recognition of the need for further incentive for communities to risk departures from the tried-and-true, another amendment provided for federal grants to cover the total cost of modifying or even replacing systems that did not perform as intended.

Within the amounts set aside, a minimum of one-half of one percent was to be restricted to innovative, as distinguished from alternative,

projects; and it was intended that the set-aside overlap rather than supplement a set-aside of 4 percent for the financing of alternative or unconventional systems for small communities.

Innovative projects are those employing new and promising technologies which have not been fully proven under circumstances of their proposed use, including totally new processes and the application of existing processes to new uses, e.g., the adaptation of a sludge-drying technique from the food processing industry to municipal sludge; alternative technologies are processes and techniques better known than those in the innovative category, emphasizing resource conservation and reuse, but not applied to their full potential because of the water pollution control community's excessive reliance on conventional processes.

Between October 1, 1978 and March 21, 1981 a total of 675 Innovative and Alternative (I&A) projects were funded, representing a total of $88.9 million in set-aside value and a total volume of design and construction work totalling $889 million, according to EPA. Of the $88.9 million in set-asides, $22.7 million went for 140 innovative projects and $66.2 million for 573 projects in the alternative category. There has been a marked acceleration in the development and funding of proposals; two-fifths of set-aside funds available for fiscal years 1979 and 1980 were committed during the nine-month period ending March 31, compared to the commitment of only one-fifth of available set-aside funds during the initial 21-month period.

Due to the long lead time characterizing the construction grants program generally, a total of only 92 facilities have reached start-up. Of those, savings ranging from 5 to 30 percent in life-cycle costs are projected to result, taking into account both initial capital and operating expenditures. Energy savings are estimated to range from 20 to 30 percent in comparison to the most cost-effective conventional alternatives.

Within the innovative category, EPA lists a total of 51 technologies covering the full range of processes from the "headworks," where raw sewage enters the treatment facility, to final processing of wastewater and disposal of sludge at the "back end" of the plant. Some represent modifications which improve conventional treatment while others represent innovations in complete "unit processes," such as entire biological secondary treatment systems, phosphorous removal, and sludge dewatering, digestion (stabilization) and disposal.

John Smith of EPA's Cincinnati municipal research laboratories, whose office operates a technical support group to provide technical reviews of innovative technology and a national I&A clearinghouse, reported on an effort to predict in advance the impact of the program for a range of time periods. He reported, in part: For the first time period (Fiscal Years 1979 thru 1981) it was estimated that the expenditure of $55 million in innovative set-aside funds would result in a construction cost savings of $345 million for a return of $6.32 per dollar of set-aside spent. For alternative technology, it was estimated that an expenditure of $199 million of alternative technology set-aside would result in a savings of $1,152 million for a return of $5.79 per alternative technology dollar spent.

As noted earlier in this report, the program initially was slow in getting under way. Observed Smith: "The fundamental issue of

higher risk/higher benefit municipal treatment technology has been accepted by the consulting engineering profession and municipalities slower than anticipated." Of 156 technologies submitted to EPA's Cincinnati support group for review, 4.5 percent were considered *too high in risk, 42.9 percent were considered to be already fully* developed, fully proven conventional technology, and 52 percent fell within a "window of acceptable risk" for funding.

Initial inertia notwithstanding, two statements by Smith suggest that the program is taking hold:

> In addition to technologies already funded, there are a number of potentially innovative technologies which are presently being considered in planning which have yet to reach design.
>
> * * * * * * *
>
> Experience during the last year of the three-year program has indicated a much wider acceptance of the I/A Program. This is evidenced by increased requests for technical assistance in the development of active I/A projects, a greater number of new technologies being proposed, and a perceptible increase in the quality of I/A facilities plans reviewed.

Response to the program has been mixed. Said the top water pollution control official of a major State: "[W]e strongly support the continuation of the program. We believe it is vital to the development of simple, low-cost alternatives for small communities." One witness from another State strongly questions the innovative nature of many projects being funded, a reservation to which a key comment by EPA's Smith is pertinent: "A small number of successful innovative technologies accepted by the industry can have far-reaching future cost and energy savings impacts." Still another State witness expressed reservations on different grounds:

First, he said that communities in his State are too far into the design stage to make consideration of I&A options worthwhile. Second, since his State puts up 20 percent of project cost and the locality 5 percent, the 10 percent bonus would result in a local saving too negligible to represent an incentive, particularly when inflation-related delays for redesigning are considered. Finally, he was also concerned about one project in the State whose design is based exclusively on laboratory work. "It is something that, to me, should have a pilot study, and it has not."

The preponderance of testimony supported the program, and indicated that the guarantee that the Federal Government will pay the total cost to modify or replace systems or portions thereof that fail to perform is the strongest incentive to innovation. The strongest disincentives are continuing concern over the potential for embarrassment—political in the case of the municipality, professional in the case of the design engineer—if a project fails, notwithstanding the availability of the federal "insurance policy." This was summed up by Donn Dresselhuys, President of Autotrol Corporation, as follows:

> The dilemma is there is a lack of incentive for the people who pay the taxes and the equipment suppliers, no incentive for those people to take a chance. The consultants throw up their hands and say all I have got to sell is my reputation. If it does not work, even with the 100 percent funding, I have to carry around that burden of something not working.

Other deterrents, stemming less from the explicit provisions of the I&A package than from the requirement elsewhere in the

law for specification of two brand names or equal and difficulties with sole-source procurement, were covered previously in this report.

Two other factors have prevented the I&A initiative from achieving its full potential. One is the lack of an adequate system for dissemination of complete and up-to-date information on processes and equipment within the industry. The other is a restriction which deters support for incremental innovation.

Equipment manufacturers cite regulations requiring that, for any part of a wastewater treatment plant to be considered innovative, there must be a cost savings of 15 percent or an energy savings of 20 percent of cost to the entire treatment works. They recommended that innovative and alternative evaluations be based on a unit process, arguing that it is difficult for an innovative improvement in a primary clarifier or aeration tank, for example, to effect such extensive economies over the entire treatment works. "What we come back to is to remind the Congress and to remind ourselves, more importantly, that improvement comes in incremental steps, often small steps, and that we cannot expect to realize gains being in heroic proportions," said Dresselhuys of Autotrol. He recommended using the analogy of a truck, that the performance of one brand of tire be compared with that of another, regardless of other elements of the vehicle such as the truck bed or ignition system.

A PROPOSAL

Many of the above problems would be addressed by a proposal made by Dr. Lue-Hing of Chicago, on the basis of the extent to which many large metropolitan sewerage agencies perform pretesting and evaluation of equipment and processes which they contemplate installing. These agencies, such as those in Chicago, Los Angeles County, St. Louis and elsewhere, have large and capable operating staffs, laboratory facilities, and monitoring and analytical capabilities. They are located in all geographic regions of the country, under all climate and other environmental conditions, and handle the full range of types of wastewater which must be treated.

Lue-Hing noted that there is too large a gap between laboratory simulation or small-scale field testing of innovative processes and components, on the one hand, and their introduction as working systems financed by public funds and upon which the grantee must rely for performance. Such a gap creates the doubt, uncertainty and reluctance to change which he and several other witnesses cite as persistent disincentives to innovation.

To inject the critically needed element of reliability, and thus gain the confidence of grantees and their design engineers, he suggested that field testing of promising but as yet untried or insufficiently verified equipment, processes and components be funded under the program. In the case of municipalities or communities lacking the capability to do the job themselves, he recommended that they contract with larger metropolitan agencies to do the job for them. Only those items of equipment and amounts of agency staff time directly attributable to the extent of field testing necessary to establish reliability would be grant-eligible. John Smith of MERL was asked whether such an activity would duplicate those carried out at his EPA facility. He responded that the Lue-Hing proposal

would complement rather than duplicate current efforts, and represented an excellent suggestion.

STATE CERTIFICATION

Delegation of the day-to-day management of the Construction Grants Program to the States under section 205(g) of the Act was not originally a principal topic of the Subcommittee's inquiry into the performance of wastewater treatment works. This was not because the Subcommittee considers section 205(g) irrelevant to the performance issue. (Indeed, although initial impetus behind its enactment stemmed from the costly delays and frustrations associated with duplicative federal and State review of grant applications, it was clearly recognized that stronger State agencies playing a stronger role in the process would produce improved management of the program.) It was rather because extensive oversight into the delegation process was carried on in the last Congress, a fact reflected in Committee Print 96–71, Implementation of the Federal Water Pollution Control Act. However, section 205(g) clearly emerged as a key issue in the most recent round of hearings as a result of extensive Administration testimony concerning its intended reliance on delegation in improving plant performance, the shifting roles of the federal agency and the States, and proposed changes in funding of State management assistance.

For background, it is instructive to recall the rationale for State delegation as offered by the principal author of the provision during initial House floor consideration of the 1977 Act:

> This would have the effect of ending the duplicative, overlapping and time-consuming review of applications by both States and federal personnel. This would strengthen program management capabilities at the State level, *while freeing EPA personnel to perform the expanded monitoring, inspecting and auditing activities more in keeping with the ultimate federal responsibility* which, of course, would remain with the agency. (Emphasis added.)

Later, in a joint statement on this provision in the Conference Report, the House managers added:

> It is the intent of this provision * * * that the funding provided result in an increase in staffing and expansion of management activity at the State level. *Further, the intent of this provision is that the sums provided not be used to renuce the level of federal or State expenditures to administer water pollution control programs.* (Emphasis added.)

In its 1980 report cited above, this subcommittee noted that in some instances delegation has been progressing well; some States have assumed increasing authority and responsibility with EPA correspondingly bowing out of the picture. In others, however, EPA has been reluctant to cut the strings and has continued its close involvement in the State's activities. The Subcommittee therefore concluded that "delegation will work to the extent that EPA allows it to, and expects the agency to move forward vigorously to fully implement the provisions of section 205(g)."

To date, 41 states and Puerto Rico [13] have entered into delegation agreements with EPA, a process often requiring long and extensive

[13] Delegated States are: Alabama, Alaska, Arizona, California, Colorado, Connecticut, Delaware, Georgia, Idaho, Iowa, Illinois, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolinia South Dakato, Texas, Tennessee Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming.

negotiation and considerable time to put into effect. It should be recalled, however, that States can assume certification authority on a blanket or piece-meal basis, taking over the entire program or just those portions within their varying capabilities and willingness to accept delegation. Indeed, while 41 States have delegation to some degree, only 14 are expected to be fully delegated by the end of 1982, according to EPA's own testimony. Typically, they will take over technical matters first, then move on to administrative and planning matters, then facility review.

According to testimony, EPA intends to rely heavily on State delegation to improve plant operation and performance of grantees, cleaning up the lines of accountability at least to the degree of removing one of the "players," namely the agency, from design review and other case-by-case involvement with projects. To this extent, the agency would address many of the concerns identified by the Subcommittee in the discussion of the accountability issue in this report. The agency expects that next year the States will be doing 50 percent of the work, the Corps another 30 percent. "EPA will be primarily in a program management role." Continued the Administrator at a subsequent point:

> It is EPA's intent to encourage, under delegation agreements, close State oversight of municipal treatment facility performance including better operation and maintenance of these facilities . . . When conducting program overviews of delegated States, EPA will include in their reviews State actions to insure proper operation and maintenance of the State's wastewater facilities.

Observing that a number of problems have arisen as a result of "tandem operation" rather than true delegation, the Administrator said "we hope to see to it that the delegation intended by Congress is fully effective, *freeing up our resources to look at, if you will, the trouble spots that can occur in any program of this magnitude.*" (Emphasis added.)

Funding has been a problem besetting this provision of the Act. Originally enacted at a time when appropriations had closely approximated authorizations, it provided for funding of delegated activities by authorizing up to two percent of a State's appropriated share each year to be used for this purpose. However, sharp declines in appropriations during the late 1970s shrank the amounts available for "State Management Assistance" under section 205(g). Concern arose in this committee that the resulting fiscal instability would prove a deterrent to States' assuming delegation initially or increasing their acceptance of an increasing number of delegated functions. Some States were described as contemplating the turning back of delegated functions for budgetary reasons, and in fact California has done so. The impact of such instability is compounded by another factor reflected in this Subcommittee's 1980 report.

> [States'] ability to staff up rapidly to handle the numerous tasks required by the law is somewhat impeded by the unavailability of qualified professionals, and lower State pay scales that make it difficult to compete with private firms and the Federal Government for the services of engineers and scientists. Once hired, new people require many months to train.

To assure the needed degree of funding stability to enable the States to achieve and maintain the capability to perform their vital role under delegation, the Congress amended the Act in 1980 to base the

two percent maximum set-aside for this function on the authorized, rather than the appropriated, amount to which each State is entitled. Now, in 1981, the Administration proposes to shift to still yet another basis, namely the amount of unobligated and unexpended funds alloted to a State. Commenting on this proposal, which has been incorporated into a pending bill in the Senate, Lindsay M. Collins of New Hampshire submitted the following to the subcommittee:

> With this formula, the fast-moving States, who have delegated authority, can slow down their payment certifications during the last quarter and effectively double their 205(g) grant. Conversely, EPA by their own means of not processing grants promptly during the last quarter can effectively cut in half the 205(g) delegation amount received by the States. In addition, the way the bill is written, if no appropriation is made for construction grants prior to September 30, the States would not have their share to count as an unobligated allotment. This would occur even if the budget was signed on the first of October and would hamstring the State for the entire fiscal year. Our State prefers the present allocation of 2 percent of the fiscal year's construction grants authorization. *The formula as in the proposed bills can be manipulated too easily to even be considered.*" (Emphasis added.)

As documented by the recitation of Congressional intent above, it was never contemplated that EPA reduce manpower devoted to an activity of the size, complexity and cost of the Construction Grants Program. Delegation simply meant that the duplication of State and federal efforts be ended; that the States be strengthened with the result that the program would be subject to more scrutiny by competent people at both levels; that the States and the federal agency remain involved, but doing different things, operation in the case of the former and oversight and audit in the case of the latter. Such is not EPA's declared intention. In a post-hearing submittal, the agency states:

> The advent of extensive delegation will be accompanied by a designed reduction in EPA staff. A coordinated and effective management and evaluation system that recognizes the shifting roles between EPA and the States is being developed to assure that national program objectives are met.

This system is to include a "shift in EPA's role from review of individual projects to one of overall program oversight."

The agency also provided for the record the following trend in agency operating resources devoted to the program in terms of work-years: 1978, 1,006; 1979, 906; 1980, 887; 1981, 797 (est.) and 1982, 724 (est.). Agency testimony also indicated that, between the advent of State certification and the end of fiscal year 1980, construction grants staffs at the State level had increased from 700 to almost 2,000; the number is expected to reach 3,000 when all States are fully delegated.

The subcommittee finds itself in agreement with EPA's intention to foster maximum delegation to the States and to fulfill more of an oversight and management role. It questions whether that function can be performed appropriately with the resources now available to the agency. And it finds without equivocation that the proposed phase-down of agency staff as delegation proceeds to be contrary to the Congressional intent underlying section 205(g). Further, the Subcommittee feels compelled to caution that simply delegating the administration of this program to the State water pollution control agencies, with or without adequate oversight by the EPA, does not

necessarily guarantee that the program's problems, particularly those related to red tape and delay, will necessarily be automatically overcome. Claiming that the king's representative can often be more royal than the king, Detroit's Moore advised:

> Large States * * * can find ways to be as bureaucratic as the federal government, and they are becoming that way. Texas now has its own State register like the Federal Register, and we are now getting so many State regulations we can't keep up with the State regulations, either.

As to funding of delegated activities, the subcommittee is content to cite the following from its 1980 report as particularly pertinent to this provision: "The Subcommittee believes that the Construction Grants Program's most critical need at this time is a period of stability and predictability."

SECTION 301(h) OCEAN DISCHARGE WAIVERS

Section 301(h) was enacted in 1977 in response to concerns that the uniform application of the Act's secondary treatment requirements would lead to treatment for treatment's sake in the case of coastal communities discharging their treated wastewater into marine waters through ocean outfalls. This was because of rapid and massive dillution, the fact that dissolved oxygen is less of a problem in marine than fresh water (making it less vulnerable to oxygen-demanding substances), and the turbulence or flushing action of the ocean which results in rapid dispersal of pollutants.

The statutory wording is strict, authorizing EPA to grant five-year waivers from full secondary treatment on a case-by-case basis to communities with existing ocean outfalls on the date of enactment of the 1977 amendments. Applicants must assure a water quality necessary for the "protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife." Other provisions require that there be water quality standards applicable to the waters affected, a system of monitoring to assess the effects, a pretreatment program for industrial facilities contributing wastes to the treatment works, and a schedule to prevent toxics from nonindustrial sources from entering treatment works. No waiver may be granted an applicant if the resulting discharge makes it necessary to impose stricter clean-up requirements on any other source of discharge or if larger quantities of pollutants for which the waiver is granted, are contemplated. The statute also established a tight—270 days—timetable for submission of applications.

From the outset, EPA evidenced no notable enthusiasm for the provision. On September 16, 1977, well before its enactment, then-Assistant Administrator Thomas C. Jorling told the committee: "We think * * * it is much too loosely written and potentially qualifies areas of the marine environment which should not receive the relief that is desired." On December 7, 1977, before final passage, the same official wrote the Chairman of the House-Senate Conference on H.R. 3199, which was enacted as the Clean Water Act of 1977, offering a rigid and narrow interpretation of the scope intended by Congress. Pertinent excerpts:

> We interpret the provision for modification of secondary treatment requirements for municipal outfalls to limit its application to very special circumstances:

those few existing outfalls into very deep waters of very high tide fluctuation areas. Only under these unusual temperature and high energy conditions can conditions exist which allow waters to receive oxygen-demanding wastes without effect on indigenous populations.

* * * * * * *

Our preliminary review indicates that there are few ocean outfalls for which any evidence has been accumulated to support an application for modification of the requirements for secondary treatment with regard to biochemical oxygen demand and total suspended solids. Although there are studies that could have the effect of justifying discharges of a higher level of oxygen-demanding substances, we are suspicious of these studies as they relate to discharges of other pollutants associated with municipal discharges.

* * * * * * *

Prudence dictates that we apply controls as rigorously as possible in order to protect the oceans. Therefore, any modification of pollution controls applicable to the oceans occasioned by short-term needs should and, as we interpret the conference agreement, is quite limited in scope.

Later, according to testimony, this Assistant Administrator headed the agency task force that wrote the regulations. Administration of this provision has been a strictly Washington-headquarters operation, with the States and EPA regional offices limited to examining applications and offering recommendations.

EPA took an already tightly-drawn statute and established both procedural and substantive barriers beyond those in the law and thus presented formidable obstacles to communities seeking to obtain ocean waivers. Procedurally, the agency demanded a vast amount of data in support of an application, leading some witnesses to question the amount and appropriateness of the information. Seventy final applications received by the agency stack up over 16 feet high, and are actually even more voluminous since they incorporate by reference other materials which must be considered in the review process. Additionally, according to testimony by the General Accounting Office and its study of the 301(h) issue, EPA proclaimed an exclusionary policy which convinced many communities that they would incur great expense in preparing an application with scant prospects of having it approved.

Substantively, the agency added eligibility requirements beyond those in the statute, ruling out facilities that discharge treated sludge through ocean outfalls, those that already meet secondary requirements, and those without full primary treatment. (Court action dealing with these and other matters is discussed below.) Initially proposed restrictions, later modified in response to public comment, were even more stringent; while they never became final, they too are evidence of EPA's approach to this provision. Testified Henry L. Longest II, Director of the agency's Office of Water Program Operations, "[T]he proposed regulations interpreted the statute to require: (1) applications to be based upon existing effluent quality and characteristics, (2) toxic pollutants to be reduced to levels obtainable by secondary treatment, (3) no increase in existing flow or pollutant volume."

Testifying on the finally adopted regulations, Charles W. Carry, Assistant Chief Engineer and Assistant General Manager, County Sanitation Districts of Los Angeles County, argued that EPA should allow comparison of physical and biological conditions in receiving

waters which would result from waivers with those resulting from denial.

In the rules governing waiver applicants, however, EPA has demanded comparison of existing physical and biological conditions (or those which are projected following implementation of planned treatment process modification) with essentially natural, unimpacted marine characteristics . . . In fact it is irrational to insist that wastewater treatment and disposal practices result in no level of impact among marine biota.

Added Deputy Mayor Ray Remy of the City of Los Angeles:

Of great concern to us is the fact that the waiver requirements established by the Environmental Protection Agency appear to be so stringent and inflexible that it is likely to be very difficult for any publicly owned treatment works to qualify.

In the same vein, Hugh J. Wessinger of GAO told the Subcommittee

EPA seemed to deliberately limit the number of applicants.

Another constraint lies in the fact that section 301(h) authorizes waivers only from a specific provision of the Act requiring secondary treatment (by 1977, subject to case-by-case extensions), but not from a separate requirement that municipalities meet a level of treatment based on "best practicable" waste treatment technology (BPWTT) by 1983. Commented Carry of the Los Angeles County Sanitation Districts:

EPA has insisted that a section 301(h) waiver does not alter the necessity to comply with BPWTT requirements of the Clean Water Act. This creates an obvious problem because in the final rules governing waiver applications, issued by EPA, BPWTT was considered equivalent to secondary treatment.

This would suggest that a waiver could not be renewed once granted.

GAO recommended that EPA revise its definition of best practicable wastewater treatment technology and the agency commented:

We agree that a revision in the definition of best practical wastewater treatment technology is required for waiver applicants that meet the statutory criteria and EPA regulation. We are currently preparing such a revision.

That was last March.

In an appendix to Longest's testimony, the agency commented:

Since permits are renewable every five years, 301(h) waivers should also be renewable, as long as the permittee can support the continuation of the 301(h) modification.

At a later point, it added that

It may be possible to develop different BPWTT requirements for marine dischargers than for other POTWs.

There is no question that Congress intended that waivers be renewable, BPWTT notwithstanding. A clear case for renewal of waivers is contained in the Statement of Managers accompanying the Conference Report, which reads, in pertinent part:

For those communities which can show that existing deep marine discharge requires less than secondary treatment, a case-by-case review waiver is provided. Such a waiver would be based on stringent criteria discussed below. *The waiver would be reviewed every 5 years to assure continued compliance with these conditions.* (Emphasis added.)

A total of 227 preliminary applications were filed, which resulted in the filing of only 70 final applications. On September 8, 1981, as this Subcommittee held a Los Angeles field hearing devoted prin-

cipally to the 301(h) situation, EPA announced its first action on applications since the provision was enacted.

Of eight applications acted upon, five were approved, involving plants in Anchorage, Alaska; Seattle, Washington; Goleta and San Diego, California, and Sand Island, Hawaii. An application for another Seattle facility was denied, as was that of Chesapeake-Elizabeth, Virginia. The eighth, submitted by Honolulu, Hawaii, was approved in the case of biological oxygen demand but denied in the case of suspended solids.

Another 25 applications have been slated for action in batches through September of 1982, according to an EPA timetable which already appears a few months behind schedule. Review of another 36 applications submitted by smaller communities has been deferred; pending such a review, the requirement for secondary treatment will not be enforced against the applicant communities.

The General Accounting Office issued a report on May 22, 1981 in which it estimated that more than 800 communities nationwide theoretically might qualify for waivers. This was based on a broad survey of coastal communities with treatment plants within a half-mile of the shoreline.

In Los Angeles County alone, one ocean outfall serves a plant seven miles inland. If all communities qualified, according to GAO's estimate, the total saving would be $10 billion. EPA has estimated a total saving of $2 billion if the largest 30 of the total 70 applications were approved and only primary treatment is required. The State of California, however, estimated in its testimony that if waivers are granted for all 12 plants in that State for which they are requested, the saving in capital costs would total $977 million. In addition, testified Michael S. Sloss, Chief of the California Water Resources Control Board's Division of Water Quality, the annual saving in operating costs would be in the range of $15 million.

Sloss and others in California make an important point. Ocean discharge waivers do not necessarily mean a decision between primary and secondary treatment, one or the other. For example, the Water Quality Control Plan for Ocean Waters of California, known informally as the California Ocean Plan, as amended in 1978, provides water quality standards mandating extensive construction and upgrading of wastewater treatment facilities in the State, even if all the waivers requested are granted. Said Sloss:

> In general, we support ocean waivers under section 301(h) of the Clean Water Act. However, we first will require that discharges to the ocean meet the standards defined in the California Ocean Plan. In California, we estimate that it will cost $1.26 billion in 1980 dollars to meet the Ocean Plan and an additional $977 million to meet the requirements of full secondary treatment.

At the municipal or metropolitan area level, the differences between Ocean Plan requirements and full secondary treatment are substantial. In Los Angeles County, the difference is about $135 million, $249.6 million versus $384.4 million in capital costs alone. Of this difference, $64 million in capital costs is accounted for by additional capacity to handle the increased volume of sludge resulting from full secondary treatment. As to the City of Los Angeles, it would cost $145 million to expand to full secondary treatment, plus $60 million to handle additional sludge. "All these costs would

be incurred for what we believe would yield only a minimal additional beneficial effect on the total environment of the Santa Monica Bay," testified Deputy Mayor Remy.

Other testimony has clearly documented the fact that low-cost technologies, conventional as well as innovative, are available to provide "advanced primary" treatment well short of secondary.

After some 10 years of study of the waters of Southern California, the Southern California Coastal Water Research Project argues that changes resulting cannot be equated with unacceptable damage. A summary of its findings: With minor exceptions, plants, invertebrates (the larger of which include crabs, starfish and shrimp), fish and birds are now as healthy and abundant as ever. The proportions of invertebrates have changed in some areas, but decreases of some species appear to be balanced by increases in others that are better adapted to the new conditions. Fishing is good, especially around the outfalls, in spite of increasing fishing pressure. Pelican populations, once apparently threatened by DDT, and kelp beds are normal. Fish and shellfish are edible.

While not dismissing concerns of toxics contained in discharges, the project has found that the coastal waters have largely recovered from the serious ecological problems of the 1960s and their present condition is quite good judged by the usual criteria of biology. Some of the old DDT, once discharged in substantial amounts, is still in the sediment of Palos Verdes, but it is steadily decreasing. In recent years, levels of both DDT and PCBs in discharges have dropped dramatically; 1979 concentrations were 3.5 percent and 13.6 percent of 1971 levels, respectively. In Santa Monica Bay there is a small region of high contamination in the bottom of a canyon several miles offshore. Animal populations have shifted and generally increased; plants are doing well. The effects of the Orange County, San Diego City and Ventura Region are small to negligible. Testifying roughly in these terms, Willard Bascom,[14] Director, of the Coastal Water Research Project summed up as follows:

> The implication of the above is that additional expenditures on waste treatment facilities cannot improve the present situation very much. If the organic solids are withheld from the sea there will be fewer fish and other animals. The ecological effects of any proposed facilities or disposal methods should be carefully studied and compared with the present situation. It is quite possible that so-called improvements will cause more ecological damage than the existing arrangements.

Work done by the Environmental Quality Laboratory, California Institute of Technology, has indicated as follows: coastal waters have a significant capacity to assimilate municipal wastewater (and treated sludge); federal law does not provide enough flexibility to permit the most effective solutions on a balanced basis, considering the effects on land, air or groundwater.

These conclusions are contained in a chapter of a forthcoming book, "The Impact on Estuaries and Coastal Waters of the Ocean Disposal of Municipal Wastewater and its Constituents," sponsored by the National Oceanographic and Atmospheric Administration. Authors of the chapter are Norman H. Brooks, head of the Caltech's Environmental Quality Laboratory, and James E. Krier, a professor

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[14] Bascom began serving as a consultant to EPA in the summer of 1981.

of law at the University of California at Los Angeles. Testifying on his own behalf and that of Brooks, Krier told the Subcommittee:

> It is clear to us. . . that in the limited instance of ocean disposal of conventional municipal wastes, the conservatism of present policy—a general (minimum) requirement of secondary treatment for POTW effluent—is, on balance, unwarranted.
>
> Several considerations support this conclusion. First, a requirement of secondary treatment for [plants] discharging into ocean waters entails very substantial costs—not just direct capital, operating, and maintenance costs, but also, for example, increased costs of sludge disposal. Second, alternative technologies—much less expensive than secondary treatment, but satisfactory because they take advantage of the oceans' enormous assimilative capacities—exist and are in fact in use. Third, and assuming effective source-control programs, secondary treatment, for all its costs, may yield negligible benefits.
>
> Conventional . . . pollutants—e.g., BOD and suspended solids—simply do not pose large risks for ocean waters when subjected to primary treatment and discharged by well-designed means. Even cautious calculation, then, suggests the wisdom of a more balanced approach in the case of ocean waters.

Krier echoed the views of several witnesses in this summary comment—the modifications to the secondary treatment requirement contained in section 301(h):

> They apply only to existing discharges, only for a limited time, and (probably) only to limited coastal regions; they cannot result in impositon of additional controls on other sources; they are rigidly constrained by water quality standards; they entail difficult, expensive, and time-consuming application procedures (the possible adverse effects of secondary treatment have never received the scrutiny to which proposed modifications are subjected). All in all, it is too early to tell whether section 301(h) will reflect the balanced attention to costs and benefits so important to sound ocean discharge policy.

The record of the subcommittee's hearings, moreover, clearly demonstrates that communities with secondary treatment should have the right to apply for a waiver. Such a community may have secondary treatment, but face the need to expand or upgrade its system at considerable cost. Secondary treatment, as the record also demonstrates, creates increasingly costly and difficult problems of sludge disposal. Moreover, capital investment in the treatment work aside, secondary treatment processes can be energy-intensive and otherwise costly to operate. These are not hypothetical concerns. GAO noted that "the small island community of Avalon, California, appears to be ideally suited for a waiver and could substantially benefit from the resulting reduced O&M expense." An Avalon councilman, Norman W. Perluss, testified that the city's energy-inefficient system would have to be upgraded at local expense to no environmental benefit. Indeed, he cited studies indicating that because of the nature of the receiving waters, no treatment in fact would be needed.

As to sludge, EPA commented:

> These prohibitions were based on EPA's interpretation of the legislative history of section 301(h) which did not indicate that section 301(h) was intended to apply to discharge of this type. In addition, because of the large amount of pollutants contained in such discharges, EPA did not believe such discharges could satisfy the substantive requirements of section 301(h).

There is nothing in the record to lead the Subcommittee to dispute EPA's reading of the legislative history. However, the U.S. Court of Appeals did find that, "The Act defines 'pollutant' to include both 'sewage' and 'sewage sludge.'" It thus concluded: "On its face,

therefore, [the] section . . . authorized the issuance of a permit to discharge sewage or sludge the applicant can meet the other conditions of the section." This may prove difficult, according to testimony. Observed Sloss of California's Water Resources Control Board, whose Ocean Plan flatly prohibits the discharge of sludge, "[I]t was known that sludge, because of their density and high organic content, would physically modify benthic [bottom] conditions and potentially affect large areas of ocean floor."

Partly as a result of the Appeals Court opinion and a Federal District Court opinion in New York (dealing with the Ocean Dumping Act rather than the Clean Water Act), the issue of ocean disposal of sewage sludge has been raised anew. This is also partly due to mounting concerns over not only the economic costs of land-based alternatives but their environmental impact in terms of air quality (incineration), and composting and landfills (scarcity of land and dangers of groundwater contamination). Several witnesses suggested the need for legislative amendments to craft an ocean disposal policy tailored to the environmental constraints peculiar to particular coastal regions, balancing all economic and environmental consequences of available alternatives.

Asked about the Agency's position in light of these opinions, Steven Schatzow, EPA Deputy Assistant Administrator for Water Regulation and Standards, responded in testimony:

> We have two major court decisions. The decision by the District Court for the Southern District of New York, in a lawsuit brought by the City of New York, challenging EPA's ocean-dumping regulations, in which the District Court held that the EPA regulations were improper because they did not allow for a balancing between the environmental harm that could be caused by ocean dumping and . . . the environmental harm that could be caused by land-based disposal alternatives. We are reconsidering. We don't have a final decision in the court yet at this point. We are considering what kind of changes in our regulations might be necessary to comport with that type of decision.
>
> The fundamental notion that we have been looking at sludge disposal and waste disposal, that it is important to consider all alternatives and balance the alternatives and the environmental impacts of all alternatives, is one that I think sits well with the agency, and in any subsequent revisions of the regulation that take place, we will certainly keep that in mind.
>
> The other decision you may be referring to is the Court of Appeals decision in the District of Columbia on the 301(h) regulations, in which the Court of Appeals held that the agency could not eliminate sludge discharge pipes from 301(h) consideration, and I believe the agency will be taking steps to implement that decision.
>
> I think it is probably fair to say that as a result of both of these decisions, more consideration will definitely be given to ocean disposal of sludge.

This new receptivity to ocean disposal as one option for sludge is shared by the National Commission on Oceans and Atmospheres, and a new group known as the Conference on Coastal Agencies. Rather than advocate an immediate reversal of the "sludge-out" (of the ocean) policies of recent years, the Conference witness, Donald A. Holt, Jr., Joint Chairman of the Orange County Sanitation Districts, observed that:

> [O]ur principal problem is simply that *there are not adequate data and technical analyses of the consequences of putting sludge in the ocean.* This must be remedied and it is one of the primary goals of CCA to assist in the development of generally acceptable testing mechanisms with adequate monitoring and with an appropriate selection of sites to develop a body of knowledge. (Emphasis added.)

Holt's own Orange County agency is interested in conducting a five-year research project discharging treated sludge through an 8.5 mile outfall into the ocean at a depth of 1,000 feet. A planning study for the experiment, supported by Orange County and the National Oceanographic and Atmospheric Administration, will be conducted by Caltech's Environmental Quality Laboratory. According to Holt, the necessary permits to authorize the actual conduct of the experiment may require changes in California State Law and federal legislation.

On the basis of the limited record, the Subcommittee considers that there is a great need for further consideration before ocean discharge of sludge becomes a matter for further legislative action. The absence of adequate data about the effects of sludge discharges to the ocean, or on the land, and the inability to compare the environmental and economic consequences of the two disposal methods does not diminish the scientific validity of the argument to take into consideration the effects of these options prior to unilaterally banning one or the other. However, as the final section of this report will demonstrate, the Subcommittee has no hesitancy whatsoever in making recommendations with respect to the discharge of treated wastewater under the provisions of section 301(h).

VIII—Fiscal Options

When the Congress enacted the 1972 Federal Water Pollution Control Act Amendments, greatly expanding the amount of federal grant assistance, it expressed a continuing interest in the examination of alternatives for financing treatment works. Under section 317 of the Act, the Administrator of the Environmental Protection Agency was directed to:

> Continue to investigate and study the feasibility of alternative methods of financing the cost of preventing, controlling and abating pollution . . . including but not limited to, the feasibility of establishing a pollution abatement trust fund. The results of such investigation and study shall be reported to the Congress . . . together with recommendations of the Administrator for financing the programs . . . for the fiscal years beginning after fiscal year 1976, including any necessary legislation.

Unfortunately, that study, which was delivered to the Congress in 1975 and called for no changes, limited itself to the examination of only three options: improvements to the existing program, an environmental trust fund, and a federal environmental loan program. Since then, however, there have been dramatic changes in both the overall national economic picture and the funding outlook for the clean water Construction Grants Program.

For small or medium-sized communities that now find themselves far down on the annual EPA/State funding priority lists the frequent "red-tape" delays that have inflated costs, the lowered levels of federal funding during the past few years, and the more than $100 billion in as yet unmet clean-up needs, collectively have one major and overriding implication: they may never receive a grant under this program. Yet, rather than giving up, some of these communities have decided to "go it alone."

In Oregon, New Hampshire, Pennsylvania and Colorado, a few committed communities have forgone the Construction Grants

Program's assistance, and moved ahead to build the necessary facilities. Their reasons were well illustrated by Lindsay M. Collins of New Hampshire:

> We have had some communities that have gone ahead without the federal money. They have gone up through the Step 2 [design phase] and then they see themselves ten years off on the list for the construction, and they have gone ahead with their own money and built them.

Collective community impatience, or frustration, with the slow pace of the federal Construction Grants Program is not the only reason some communities have elected to move forward on their own. There are several others, most notably the time, and hence, inflation-related cost, that can be saved.

In almost all instances, the decision not to seek a federal construction grant eliminates most, if not all, of the federal and State involvement in the planning, design, and construction stages, particularly the latter two where most of the dollars are spent. As a result, communities can proceed two or three times faster than the normal program in which it takes an average of eight years to complete a project.

The savings that can result from this are appreciable. For example, using the nonresidential construction inflation rate for the past few years, 9.8 percent, a $4 million project delayed for four additional years would increase in cost by approximately 40–45 percent.

Further, when a community pays for all of the construction costs, there is a self-interest in choosing less expensive and less sophisticated technologies than those which require high operating skills and high operating and maintenance costs. Communities will also be more circumspect about "growth" capacity since this is a future "benefit" with a present cost that must be borne by the current, smaller population. Yet, the Federal Government need not be involved in the determination of any of these decisions.

Finally, bypassing the federal program leaves decisions about subsidizing the costs of constructing industrial capacity, or of providing additional capacity for the purposes of attracting industry, to the local community.

Together, these factors can have tremendous results. Pennsylvania consultant Tracy Greenlund, testifying before the Subcommittee, noted that he tends to have clients who prefer not to be involved in the EPA program. In commenting on one who had gone ahead with his design for an alternative form of wastewater treatment, he noted:

> Because of the combination of the low cost, capital cost, but more importantly, low operating costs, and the fact that we did not have to fiddle with all the regulations, these projects, the one that is to be operational next month was started almost exactly two and three quarter years ago . . . *Now, without federal funding, in two and three quarters years we have got a plant that is going into operation.* Under the normal EPA scheme you are talking about six, seven, eight, nine years. (Emphasis added.)

Yet despite these advantages and their willingness to go ahead,, not every community is happy about it. Noted New Hampshire's Collins: "They keep asking, 'Is there any way we will ever get reimbursed?' and we keep telling them no. But they saw the benefit of [building] it and they did go ahead." Added Collins: "In addition,

we do have a system where the municipality's bonds are guaranteed by the State, so this has given them a triple A rating, which saves in the long run."

Given these advantages, it would seem logical that more communities would be moving forward on their own to comply with the law. Yet that is not happening. In part, this stems from the historical tendency of communities to give the construction of wastewater treatment facilities and their subsequent operation and maintenance very low priority. Noted the Water Pollution Control Federation's Guarino: "When I started with the City of Philadelphia, I started at a sewage treatment plant, and I can tell you they did not even know we existed . . . It was something that you put in the back side of town and no one paid any attention to it."

While the priority given to wastewater systems has somewhat improved—in response to federal and state statutory mandates to clean up—water pollution control must still compete with schools, city halls, libraries, fire stations, and other public works for the municipal capital construction dollar. And as long as a community can get by without treating its waste discharges, it can be expected that sewage plants will at best remain close to "the back side of town."

For the past several years, levels of actual annual federal appropriations for this program have averaged $1.7 billion less than the $5 billion authorized. This is in contrast to the $120 billion in as yet unmet needs, and has provided many communities an excuse for keeping capital expenditures for wastewater treatment at the bottom of their local priority list. Few communities are willing to put up their share and compensate for the lack of federal funds to do something the Federal Government told them they had to do. Noted Merilyn Reeves, Natural Resources Director of the League of Women Voters of the U.S.:

> Unfortunately, some now seem to believe that the Construction Grants Program is an entitlements program and that the Federal Government is responsible for paying 75 percent of the costs of constructing all treatment plants, collector sewers and interceptor sewers. Some also believe the Federal Government should pay for reserve capacity for growth. We disagree. Local and State governments must assume a greater responsiblity for municipal waste treatment.

The current federal law does not explicitly tie compliance with municipal pollution abatement requirements to the availability of federal grant funds. Nonetheless, there has been little effort on the part of federal or State officials to enforce against slow-moving communities in the face of limited federal appropriations. Nor do the prospects for future funding give any indication that things will get better. Commented EPA's Gorsuch:

> Escalating cost estimates represent the major crisis which now confronts the construction grants program. The federal share for meeting currently estimated needs is now more than $90 billion. In our current economic situation, we would be mischaracterizing the true state of affairs to suggest that this kind of money is presently available. It simply is not.

It would seem then, that if there is any interest in increasing the number of communities that are willing to go it alone, there are going to have to be as many incentives as possible. While most of the incentives mentioned earlier are, in a sense, automatically available to those who choose this route, reduced borrowing costs

that stem from low risk ratings, such as that available to New Hampshire communities, are not. In this regard, it would seem appropriate to consider expanding the availability of this advantage nationwide for the purposes of this program.

There are two basic methods for achieving this: federal loan or bond guarantees, and the taxable bond option (TBO). The former, for which some limited authority already exists in the law, would in effect reduce risks, and hence the interest rates, by placing the full faith and credit of the Federal Government behind a bond issue. While many will argue that this approach creates a new fiscal "exposure" for the Federal Government due to the potential default by some communities, there are several factors which should be considered which shed some light on this.

First and foremost is the historical track record of municipal bonds. Annually, about 8,000 units of local governments issue bonds, with the total outstanding State and local debt estimated to be $265 billion in 1977. Yet between 1940 and 1970, only 491 issues defaulted, and financial experts continue to view this market as relatively safe.

Second, the Subcommittee believes that this option would best serve smaller communities (those with populations of 25,000 or less) that may never receive federal grant assistance, given the reduced funding levels being proposed by the Administration. These have, according to the latest U.S. EPA Needs Survey, approximately $30 billion in unmet pollution needs, some 25 percent of the total of all needs.

Further, any amendment that would expand this existing loan guarantee option for this purpose could include a requirement that defaults be liquidated from sums annually appropriated for the Construction Grants Program, thereby internalizing most, if not all, of the federal costs that might accrue and further limiting the net federal exposure.

Finally, consideration could be given to limiting the number of bond issues to receive this guarantee annually to some fraction of the total annual construction grants authorization, thereby ensuring that only a limited fraction of appropriated funds might be called upon to liquidate a defaulting community's obligation.

The taxable bond option (TBO) is an alternative mechanism that would allow local governments the option of issuing either their traditional tax-exempt bonds or taxable bonds, which ever might provide them with the lowest costs.

Under this approach, a local government issues the taxable bonds at the going taxable market rate, and then is annually reimbursed by the Federal Government some percentage of that cost, ideally somewhere between 35 to 40 percent. In turn, the U.S. Treasury collects taxes on the total interest paid to the holder of the bond, thereby offsetting a significant portion of the interest subsidy paid out to local governments.

Advocates of the TBO see it as a mechanism capable of expanding the potential market for municipal bond buyers, strengthening the market by removing some of its interest rate volatility, and eliminating the tax loss, or "tax expenditure," due to the federal exemption of municipal bond interest from income taxes, particularly since many of those who buy municipal bonds are in the high tax brackets.

In 1976, the estimated tax revenues foregone as a result of free bonds was $4.2 billion. Yet local governments received only $3.0 billion in the form of reduced interest rates on their bonds—some 70 percent of the total lost tax revenue. The remaining $1.2 billion was simply paid out as tax free interest, and bond-issuing fees. This "wastage" is eliminated in the use of the taxable bond option. For example, it is estimated that if presently outstanding tax free municipal and State debt were to be refinanced using TBO's at a 40 percent subsidy rate, the annual tax loss to the Treasury would be reduced by 86 percent, to $500 million, as opposed to the $4.2 billion.[15] Further, for each dollar of cost to the Federal Government at a 40 percent rate, local governments save six dollars.

Opponents of the TBO claim it may undermine the municipal tax-free market by luring communities and buyers away from it. Further, they are concerned that the Federal Government may try to use the subsidy to intervene in local decision-making and priority setting, and still others note that the purchase of TBO's by tax-exempt institutions could substantially reduce expected federal revenues from these bonds, thereby driving up the costs of this option.

Overall, however, the Subcommittee believes that the TBO may have significant potential as an additional incentive to encourage small communities to build wastewater treatment facilities. Further, if they were used only for wastwater treatment, the impact of this option on the existing tax-free and taxable markets would be rather limited, while providing a considerable interest subsidy to local communities at a very low net cost to the federal taxpayer.

There is one additional national advantage to providing either of these additional incentives for small communities to go it alone: To the extent that more communities do so, there will be fewer of the program's long term needs, those down at the bottom of the priority list, remaining to be met. Given that the current program effectively rewards those that wait and delay, it would seem only appropriate that those who seek to move ahead on their own be rewarded as well.

VIII—Waste, Fraud, and Abuse

In November, 1979, when former EPA Administrator Douglas M. Costle appeared before the Subcommittee to discuss his administration of the Construction Grants Program, he testified that: ". . . although this is one of the largest federal assistance programs in history, there have been no major scandals, as there have been in most such programs."

That there have been no "major" scandals as yet revealed in this program is true, at least in comparison to those that plagued the Federal-Aid Highway Program during its early years.[16] To suggest that this program is free from fraud or other criminal activities, however, would be misleading.

[15] These figures are based on 1976 data. The future tax loss or tax expenditure will most likely be somewhat less due to the lower tax levels resulting from changes in federal taxes enacted in 1981. However, the larger market for "taxables," as compared to that for "tax-exempts," should provide a high level of interest in the TBO, despite these changes.

[16] Between 1957 and 1964, the Subcommittee, then known as the Special Subcommittee on the Federal-Aid Highway Program, conducted investigations and held hearings that led to the discovery of widespread fraud, graft, and corruption in that multi-billion dollar program. The Subcommittee's efforts also identified the absence of adequate State and federal management policies, practices and procedures, particularly those related to ensuring that quality control mechanisms were actually functioning as intended, as a major factor in that program's problems.

In fact, there have been and continue to be problems of this sort. For example, in a project on Long Island costing hundreds of millions of dollars, indictments and some convictions have flowed from Justice Department investigations into charges of fraud, conspiracy and racketeering by those involved in the design, construction and supply of materials to this project, one of the largest in the country. In Jefferson Parish, Louisiana, nonexistent firms were found to be the recipients of a large portion of federal funds provided for a $2 million facilities planning study. And, as of January, 1981, the EPA has a number of other major projects under investigation for alleged fraudulent practices related to the design and construction of wastewater treatment works.[17]

Perhaps of even greater concern, though, is the amount of waste and abuse that has occurred in this program. Over the past several years overly stringent treatment requirements and lax review procedures have resulted in the expenditure of millions of dollars for advanced waste treatment (AWT) plants where the costly additional margin of treatment provides little or no additional water quality improvement.[18]

In other instances, millions are being spent to repair or replace treatment works that fail to perform properly, be it due to poor design, deficient construction or inappropriate choices of technology. For example, four federal grants totalling $1,009,000 [19] have failed to correct all of the deficiencies in a treatment system in a small Wyoming town. Local and State officials are considering abandoning the system altogether, in which a total of $1.15 million has now been invested, in favor of refurbishing the septic tanks that area residents had relied on originally, an option that is estimated to cost only $160,000.

In Maine, federal officials provided an additional $3.635 million in grants to fund 100 percent of the costs of replacing that town's new treatment works because it failed to perform properly. The plant, an innovative system when originally designed and constructed with $2,069,300 in federal EPA grants, was abandoned [20] because it was incompatible with the replacement technology.

In San Jose, California, alleged design deficiencies in that community's 143 million gallon a day treatment plant will cost approximately $20 million to correct. The EPA expects to advance most of this cost to the community, to be reimbursed when the liable party is determined—if ever. And in Minnesota, local officials in the Minneapolis/St. Paul area recently approved payment of $30 million in cost overruns due to design deficiencies in the "Pigs Eye Treatment

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[17] Given the continuing nature of these investigations, and the possibility of criminal action, the Subcommittee has intentionally omitted specific information.

[18] In December of 1980, the subcommittee issued a report, Committee Print 96-71, addressing the AWT problem. The report noted that: "One of the most obvious conclusions is that PL 92-500 itself, including its array of requirements, objectives, and timetables, plus various incentives not necessarily traceable to the law itself, have encouraged communities to err on the side of stringent pollutant removal." Since then more stringent AWT project review requirements, mandated by the Congress, have resulted in $113.8 million in savings, and the reevaluation of the need for AWT by many States, resulting in the further elimination of $6.1 billion worth of additional AWT projects. The report further recommended that there be a moratorium of federal funding of high-level AWT projects, as opposed to AST, for the next few years, until better analytical methods for determining the need for this costly, margin of treatment can be developed.

[19] Of the four grants, three were made by the EPA in 1973, 1974 and 1978, totalling $709,000. The fourth was made by the Economic Development Administration in 1978, for $300,000.

[20] Some of the original plant was put up for sale. However, the final disposition of the plant has yet to be determined, as litigation is still pending. Some state and EPA officials have apparently written off the cost of the first facility as the price of trying something new.

Plant," the area's major treatment facility. Yet to be determined is the amount of this overrun that may be picked up by the federal taxpayer. Under the existing 75 percent federal grant program, it could be as much as $22.5 million.

One of the most disturbing examples of waste, however, surfaced during the first of several days of oversight hearings held in July, 1981, when Joe G. Moore, Jr., Assistant City Administrator for the Detroit wastewater treatment plant, advised the Subcommittee of a recent decision not to use a major interceptor sewer that was just then being completed.

Constructed at a cost of $80 million, the interceptor was intended to deliver sanitary sewage to the Detroit treatment works without passing through the area's combined sanitary-storm sewers, which overflow raw wastes to area waters during wet weather. However, the pump station that was to be used to lift the sewage from the bottom of this interceptor up into the treatment plant will now not be constructed due to changes in the plans for the overall sewer system.[21] As a result, the sewer is to be capped off and abandoned, unless some other use for the lines can be developed. "We may find a way to put some pumps we already have on the end of the interceptor," noted Detroit's Moore, "but it will never work the way the interceptor was designed to work if you do it that way."

There are obviously many factors—institutional disincentives, technical or analytical limitations and requirements of both federal and State laws—that have contributed to the occurrence of these and the many similar situations in the Construction Grants Program. These have been addressed at length in both previous sections of this and a previous Subcommittee report. Further, in a program as large as this one, some degree of inefficiency and even waste can be expected, as history has shown. Noted a former Subcommittee chairman, John A. Blatnik, during oversight hearings in 1961 on the multi-billion dollar Federal-Aid Highway Program: "The size of the program itself, the vast sums of money involved, invite exploitation unless there are proper safeguards."

In early 1976, during the Subcommittee's investigation of the Long Island project mentioned previously, another former Subcommittee chairman, concerned about the adequacy of the program's safeguards, wrote to then EPA Administrator Russell E. Train about the possibility of "serious deficiencies" in the program, and called upon him to undertake ". . . a thorough and comprehensive review of these very large and costly construction projects . . ." Added the Member: "I think it vital that we do what we must to assure the integrity of this massive construction effort." Yet in the five and one-half years since that was written, it would appear that little has actually been done toward that end, and that efforts to ensure that funds are being effectively and properly spent in this program are largely paper shuffling exercises, long on form, short on substance.

In December of 1977, EPA's Office of Audit completed a report, subsequently released in July of 1978, criticizing the agency's own

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[21] The Detroit wastewater treatment clean-up program, which includes the interceptor project, has been proceeding for the past few years pursuant to a schedule contained in a Consent Agreement under the jurisdiction of a Federal District Court. According to testimony and other documentation provided to the Subcommittee, the decision not to build the pump station needed to make the interceptor operational was agreed to by all parties to the Consent Agreement—EPA, the State and the City of Detroit—and subsequently incorporated into the Agreement itself.

program for conducting interim and final project inspections. Noted the report:

> The quality of EPA administration of the Construction Inspection Program has not improved since our last consolidated report of EPA's Administration of the Construction Grant Program over four years ago (Audit Report No. E1W2–11–022–052, dated July 16, 1973). Virtually the same deficiencies exist except on a significantly broader scale. *** The quality of EPA's administration of the Construction Inspection Program can justifiably be described as inconsistent and shallow. *** If design or construction defects are corrected, they are done so, all too frequently, at the expense of the taxpayer rather than those parties responsible for the quality of the new construction. *** Current methodology used by these [EPA] regions to select projects for interim inspections can best be described as a "hit or miss approach".

Equally limited is the EPA's ability to conduct audits and follow-up on questioned costs. Lacking adequate resources, personnel and information-handling and tracking systems, the agency has fallen behind and continues to struggle with an apparently ever-growing backlog.

In March, 1977, the agency was burdened with 457 unresolved audit reports questioning costs of $43,061,000. Eighteen months later, EPA officials testifying to a House Government Operations Subcommittee noted that the total amount of unresolved outstanding costs had risen to $95 million. In June of 1981, EPA officials appearing again before the same House Government Operations Subcommittee noted: "There have not been significant improvements to EPA's actions over the past couple of years in responding to audit reports."

Not only had the agency had problems following up on audits it has performed, but in conducting them in the first place as well. In her testimony to the Subcommittee in the previously mentioned July, 1981 Subcommittee oversight hearings, EPA Administrator Gorsuch stated that the agency is currently trying to cope with a backlog of more than 1,000 project audit requests representing millions of dollars of federal investment. "We do not yet know what we have purchased for these funds," said Mrs. Gorsuch.

To some extent, a 1979 report by the EPA Office of Audit, focusing on the practices and procedures used to review and approve project change orders, may shed some light on what is to be found in those 1,000 unaudited projects. The report noted that many change orders, some as large as $2 million, lacked sufficient documentation to substantiate claims, and that in many instances change orders were submitted and routinely approved despite the fact that they contained excessive mark-up for overhead and profit.

Even more disquieting was the report's comments on the use of change orders for maintenance purposes:

> Our review of projects for the modification and expansion of treatment plants disclosed a common problem of change orders submitted and approved which appear to be for normal repair or replacement of existing plant components. We recognize that some of the change orders may result in increased plant capacity and therefore would be eligible for EPA participation. However, in most instances there was no evidence that the State agencies or regions reviewed the change order to determine whether it was for normal repair or replacement work. We noted examples of large change orders for replacing of outfalls and effluent lines and for repairing engines, mortar boxes, valves, pumps, meters, heat exchangers, primary digester roofs and walls, and administrative buildings.

More recently, in March, 1981, EPA's Office of the Inspector General (OIG)[22] issued a report on its preliminary findings from a review of several major projects singled out for in-depth examination, and the collective results of prior reviews of both grants projects and program management policies and practices.

The report, which was issued "because of the significant nature of problems being identified on an across-the-board basis," noted that "deficient work by consulting engineers and contractors has permitted the building of treatment works which were poorly planned and inadequately constructed at excessive costs to the public." Further, the report stated: "EPA and State reviews were not sufficiently comprehensive to identify significant deficiencies in designs plans and specifications, construction, or management of grant projects," a point acknowledged by EPA Administratior Gorsuch during the Subcommittee's July, 1981 hearings. "By allowing such weaknesses to exist," the report concluded, "EPA has created a climate in which waste and abuse thrive and little is done to protect the public interest."

Ironically, this allegation is made at the very time when the new Administratiou has set the eradication of waste, fraud and abuse as a top goal. Referring to waste and fraud as an "unrelenting national scandal" which the Administration is determined to address, the President has stated that: ". . . we will not tolerate fraud, waste, and abuse of the taxpayers' dollars. Every allegation of wrongdoing, every investigative lead will be pursued thoroughly and objectively."

In their defense, EPA officials point out that some of these reports, by design, focus on problem projects, and thereby do not reflect the overall quality of the program. Further, they argue several mechanisms are now in place or being expanded to address earlier shortcomings in the management and oversight of the Construction Grants Program. Chief among these are efforts by the Office of the Inspector General and the Army Corps of Engineers, the latter via an interagency agreement. However, despite these assertions, there is evidence that these may be little more than palliatives for Congressional concern.

A recent review by the Subcommittee indicates that during the past few years, the staff of the Office of the Inspector General has been cut by 22 positions to 121 personnel and that travel has been cut back significantly, at times so severely that auditors have not been able to pursue their duties for months at a time. Further, audits of virtually all other agency activities, and other grant-in-aid programs involving hundreds of millions of dollars annually, have been halted. There is presently a 70 work-year backlog in audit requests, and, as noted previously, millions of dollars in questioned costs on audits of Construction Grants Program projects that have been done have gone unresolved, sometimes for years.

With respect to inspections, two of the agency's audit regions, covering 27 States and more than $10 billion in active grant projects, have no investigators in them, and only half of the ten

[22] Pursuant to the provisions of the Inspector General Act of 1978, the Office of the Inspector General is responsible for conducting audits and investigations of the EPA Construction Grants Program, and all other agency activities. Under that statute, the Office of the Inspector General assumed the general functions and duties previously carried out by the EPA Office of Audit and the Security and Inspection Division.

investigators that the agency has are fully qualified to independently pursue criminal inquiries. These ten investigators must cover some 12,000 active projects, involving tens of billions of dollars, as well as any other investigations of programs or problems that exist in all of the EPA areas of responsibility, not just the Construction Grants Program.

Finally, because numerous projects have never been inspected or audited, many have now been paid their full federal share, leaving little or no leverage for the Federal Government to resolve any problems that may be uncovered.

Similarly, the interagency agreement between the EPA and the Corps of Engineers is also suspect to many. Initiated in 1978 and renewed in 1981, the agreement provides for a review of State and EPA-approved construction plans and design specifications by the Corps for "buildability" and "bidability" prior to their being put out for bid. Further, the Corps provides one on-site inspector for projects valued at $50 million or more, and occasional inspections of smaller projects by Corps personnel.

The effectiveness of the Corps' effort to date appears to be mixed. While no overall review of this effort has been conducted, preliminary checks by the EPA itself raise questions as to just how substantive these stewardship efforts by the Corps are. Noted the OIG's March, 1981 report:

> On some projects, interim inspections [by the Corps of Engineers] have identified significant deficiencies which require correction. On other projects, however, the Corps reviews have failed to identify significant deficiencies which have occurred on the projects.

EPA officials maintain that all these efforts are actually supplementary to those that are to be performed by the municipalities which, according to the agency, are ultimately responsible for the integrity of their respective projects. Stated the EPA Administrator at the Subcommittee's July, 1981 hearings: "It is and must be the grantee's responsibility to assure completion of the project in accordance with the specifications and the grant conditions."

While this may be so, and indeed, the law itself calls upon the grantee to provide adequate assurances, there is virtually no substantive system to ensure that these delegated responsibilities, which are subsidized by the grants program itself, are in fact being carried out in a meaningful way. Commented the EPA Inspector General, in his March, 1981 report:

> Despite EPA's participation in the cost of full-time resident inspectors on site to observe construction, we found that consulting engineers were not identifying many of the construction deficiencies which were occuring. Where deficiencies were identified, the engineers were not reporting the deficiencies to the grantees or taking other appropriate actions to have the deficiencies corrected. Additionally, consulting engineering firms were not properly maintaining adequate inspection, surveying, as-built, or other records showing what had occurred on the job. Engineers' documentation and review of change orders was consistently inadequate.

Ironically, the EPA is now, after eight years, beginning to respond by developing disbarment procedures for use against negligent contractors and others who fail to fulfill their obligations on grants projects, and detailed guidance to combat deficient work and additional costs which result from the misuse of change orders by grantees.

Further, apparently having second thoughts, the agency now intends to reinstate two earlier efforts to monitor the quality of construction grants projects: the "Construction Operation Review" (COR) and the "Construction Management Evaluation" (CME).

In further explanation of these program shortcomings and limitations, the Administrator argued—during the Subcommittee's July hearings—that to respond to the totality of the problem might be impractical "[I]f we were to operate in a perfect world," she said, "we would have fully one-tenth of all people committed to environmental duties on the federal level in the Inspector General's office. I just don't see that as a realistic administrative goal to pursue."

Indeed, such an army of inspectors and auditors would in fact be both impractical and unrealistic. Nonetheless, this cannot, in the Subcommittee's opinion, be accepted as an adequate justification for the status quo. There are simply inadequate resources available to carry out the responsibilities of the Inspector General to this program, as well as to other EPA programs.

There is no assurance that these conditions will not sooner or later lead to major scandals. In this regard, it would seem much more rational and responsible, particularly in view of the rather large portion of these funds that are provided by the Federal Government, to have the mechanisms and organization, within both the EPA and the several State agencies, that would be capable of constantly surveying the operations of this massive program, and of sounding alarms at the first signs of distress.

Finally, the Subcommittee feels compelled to note that the need to ensure that rules and regulations, and management policies, practices and procedures are complied with is paramount. If such rules and procedures are inappropriate, then they should be changed, not disregarded. If policies and regulations are inappropriate, they too should be changed, not ignored.

It would only seem to make sense that those at both the federal and State level who are responsible for the management of this program—a program which spends billions of dollars each year—have, not only for the Congress, but for themselves, the capability of knowing that they are carrying out their mandates and responsibilities, their public trust, with efficiency and economy. It seems inconceivable that any manager or project officer can comfortably accept the responsibility and accountability for the billions of dollars spent each year with neither a substantive system for auditing and inspecting the results nor the means to find out whether the system to do so is working.

IX.—Conclusions

It is clear that there remains a large number of unmet municipal pollution clean-up needs, and that meeting these needs will require the expenditure of billions of dollars. In fact, if the nation is to realize both its clean water objectives and the full benefit of its investment in facilities already planned, designed, or partially constructed, the Construction Grants Program will have to be continued over the next several years. Questions remain, however, as to what proportion of the costs of meeting these needs federal, State and local taxpayers should bear, how soon the job must be completed, and

how the construction of more cost-effective and economically affordable plants can be encouraged.

Equally obvious is the need to strengthen the program's incentives for properly operating and maintaining existing and newly constructed treatment works. Testimony to the Subcommittee has clearly established that a substantial majority of treatment works constructed with federal assistance under the current and prior federal laws operate at or near their expected levels of performance, and do so at a very affordable cost to the nation's households. In contrast, some one third of all existing plants, and as many as 20 percent of the newly designed and constructed facilities, do not; this is totally unacceptable.

The Subcommittee believes that some fundamental changes must be made in this program if this performance shortfall is to be remedied. Lines of responsibility within the grants program's review and approval process must be simplified and clarified, and accountability for performance of newly constructed facilities more readily established. Alternatives to the current step-by-step grant process should be pursued. Methods for establishing the qualifications of participants—engineers, equipment manufacturers—need to be strengthened. Commitments by local officials to properly operate and maintain a treatment works—a statutory prerequisite to receiving grants funds—need to be more stringently enforced, and more must be done to ensure that monies that are made available are properly spent.

The Subcommittee is not persuaded that the EPA's enforcement efforts to date, and those of many States as well, have been adequate The overall track record of municipal enforcement in this program is rather undistinguished, particularly in those non-grant-related areas where improvements can be made. The record demonstrates beyond question that many marginally performing plants, and even many of those that have serious operating deficiencies, do *not* require costly physical improvements. Many problems can be remedied simply by upgrading operation and maintenance; in some instances, minor expenditures for replacement or modification of the existing works will suffice. Yet, only recently has this approach towards compliance begun to receive emphasis.

In fairness, it should be pointed out that unrealistic compliance deadlines established by the 1972 Act, a matter that has been repeatedly noted in prior Subcommittee hearings and reports, can make it difficult if not impossible to develop a reasonable, logical enforcement program for use against communities. While the statute is clear in its deadlines and authorization levels, funding has not been forthcoming at the rates anticipated, leaving many communities with raised expectations and unfulfilled federal promises.

There needs to be a change in attitude concerning the purpose of the Construction Grant's Program on the part of those who wish to avail themselves of this source of federal funding. The Construction Grants Program is not and should not be considered an entitlement program. Yet the current statute provides equal amounts of grant assistance to those who delay as to those who choose to move forward expeditiously. In effect, the program rewards with equal funding those who resist federal or State administrative orders and litigate over requirements and those who are prepared to go ahead without complaint.

The absence of a comprehensive municipal enforcement program has also worked to handicap the EPA's present policies of relying on the private sector to supply the needed expertise for operation and maintenance corrective efforts. Absent a strong legal or fiscal incentive to take action, history has shown that too few communities will take the necessary steps to remedy operating problems.

Even more serious, in the Subcommittee's view, has been the reluctance of EPA to make use of existing statutory tools and resources for training "trainers" and for constructing training facilities. True, the federal role and level of involvement in this area should be limited so as to encourage municipal self-sufficiency, and not compete with those private sector resources that are being encouraged. Yet not all training can be done through reliance on on-the-job techniques, particularly when new facilities or plants that have been completely upgraded are involved, and there is no in-house expertise on the new process.

Many of those testifying before the Subcommittee have advocated that training and operation and maintenance be a local responsibility, and the Subcommittee is inclined to agree, especially in view of their cost-effectiveness and affordability. But there has to be both an incentive to seek this training and a place or resource from which it can be obtained. And it is in this latter area that the Subcommittee believes that there is, and will continue to be, a vital and necessary federal role.

The thousands of treatment works that are in operation or now under construction, and the thousands more that will continue to come on line in the years ahead are being built at great public expense, for a public good, and pursuant to a federal mandate. Given the massive federal financial stake in these facilities, the Subcommittee believes that the federal government must ensure that they are properly operated and maintained, and that there is an adequate supply of properly trained personnel as well. Whether the personnel are on the municipal payroll or are provided by private firms specializing in plant operation under contract, there must be a complement of adequate staff—"people infrastrucutre"—commensurate with the public investment in the physical facilities and the degree of skill needed to operate them.

Accomplishing these objectives will necessarily require more than punitive enforcement measures. Technical assistance, training, and programs to train "trainers" are needed. Manpower forecasting as called for by the original statute must be continued, and programs to ensure that there is an adequate supply of properly educated engineers, designers, operators and managers must be encouraged.

Similarly, the Subcommittee believes that more must be done to encourage both cost-effective and affordable—the two terms not being synonymous[23]—treatment technologies that are reliable and easy to operate, and the design of innovative wastewater treatment

[23] To comply with the law, and EPA regulations, projects must be cost-effective; that is, they must remove the greatest amount of pollution per dollar of treatment possible. Many of the technologies that meet this requirement, are on a per-household monthly basis, very expensive and often unaffordable to lower income residents of a community, while other less cost-effective technologies, may be far more affordable, and, in the opinion of many, adequately meet clean up needs, even though they remove fewer pounds of pollution for each dollar spent on the project.

systems. However, achievement of more innovation will require removing some of the program's inherent institutional disincentives, deeply ingrained in its overall structure, which discourage the development and acceptance of new approaches. This will not be accomplished easily or quickly. The record continues to demonstrate that the best changes come slowly and incrementally.

More should also be done to encourage communities to go it alone and forgo the federal subsidy provided by the Construction Grants Program. It is obvious that, even if this program were to be continued indefinitely, considerable savings could benefit those who pursue this alternative rather than await their turn at the federal construction grants window. Alternatives such as loan or bond guarantees or taxable bond options, which could further lower the costs to these communities, and require only marginal net costs to the federal government, seem to have considerable merit, and should be made available.

The Subcommittee also believes that eliminating funding for what appears to be a very cost-effective expenditure of federal funds, the correction of infiltration and inflow problems (I&I), while continuing to allow less cost-effective expenditures for such things as Advanced Waste Treatment, is not sound policy. Federal monies should not be available to communities for resolving only those problems that Washington cares to recognize, but rather for addressing whatever problems actually exist, so long as the proposed solutions are the most cost-effective possible.

Finally, the Subcommittee finds the agency's commitment to ensuring the integrity of this program to be inadequate. Over the past several years, the Subcommittee has continued to comment on the allocation of deficient resources to the functions of audit, inspection and investigation of this multi-billion-dollar effort. At a time when the program faces significant reductions in its funding levels, the reluctance of the agency to provide a more reasonable level of resources for this function compels the Subcommittee to remommend more definitive action by the Congress on this matter. The present commitment gives the Subcommittee no feeling of assurance as to integrity of expenditures of Construction Grants Program funds.

X—Recommendations

1. The construction grants program should be continued for at least 10 years

While much progress has been made and more is in prospect, the "catch-up" job envisioned under the 1972 Act is far from complete. Much has been done by industry as well as municipalities, but the health of a given body of water depends on substantial control of all point sources discharging into it. Failure to complete the job would mean that much of the public and private funds invested in municipal and industrial treatment works would be nullified by remaining sources of pollution. The record—pre-1972 and since—amply demonstrates the need for a federal financial commitment. The record also demonstrates that proper operation and maintenance

of treatment facilities requires a genuiue commitment on the part of the municipality, a commitment likely to be elusive if the Federal Government leaves the Act's regulatory requirement intact while reneging on its funding commitment.

Furthermore, there is a continuing federal interest arising from the interstate nature of the waters affected and the implications for public health associated with pollution.

Unlike other federal assistance programs of a public works character, eagerly sought after by applicant communities, construction of wastewater treatment works is a federally mandated program. Finally, with more than $30 billion already obligated in funds previously made available, abrupt termination of the program at midpoint would create a problem of equity in treatment of projects not yet funded.

2. THE FEDERAL SHARE OF ELIGIBLE PROJECT COST SHOULD BE GRADUALLY REDUCED BEGINNING WITH FISCAL YEAR 1983 TO A LEVEL OF 55 PERCENT BY 1986

The reduction of the federal share should be done in the interests of both economy and treatment works performance. The Subcommittee recognizes the budgetary constraints that have made it necessary to reduce funding for the program. A lower federal share will stretch the available dollar to more projects. There are also policy grounds for reducing the federal financial responsibility for what, in an ideal world, would be a local responsibility. In addition, it is beyond dispute that the 75 percent federal share leads to a sense on the part of the State and the municipality that the projects are financed with free money. A greater non-federal financial stake in the program would lead to improved stewardship and the design of less ambitious and costly facilities.

3. EXISTING COMPLIANCE REQUIREMENTS APPLICABLE TO MUNICIPALITIES SHOULD REMAIN IN PLACE AS A BASIS FOR ENFORCEMENT. HOWEVER, THE AUTHORITY OF THE ENVIRONMENTAL PROTECTION AGENCY TO GRANT EXTENSIONS FROM COMPLIANCE DEADLINES ON A CASE-BY-CASE BASIS SHOULD BE EXTENDED INDEFINITELY

The Congress must recognize the effect of funding cut-backs on this program. This it did to some extent in 1977 by providing for extension of the 1977 compliance deadline for municipalities to 1983 on a case-by-case basis, partly on grounds that "the United States has failed to make financial assistance under this Act available in time to achieve such limitations by the time specified . . ." But the Congress has never provided by statute that a municipality's compliance with the requirements of the Act is contingent upon the availability of federal funds authorized by the Act. Such would be poor policy. However, the 1972 Act pledged a massive investment of federal funds combined with strict requirements and tight compliance deadlines. As the federal financial commitment is scaled down, whether in terms of grant share or total funding, it is reasonable to craft a compliance schedule more in keeping with fiscal realities.

4. ALTERNATIVE MEANS OF FUNDING BY EXPANDING THE EXISTING LOAN GUARANTEE AUTHORITY IN THE LAW OR BY PROVIDING TAXABLE BOND OPTIONS, SHOULD BE CONSIDERED AS A MEANS OF ENABLING SMALLER COMMUNITIES WISHING TO DO SO TO PROCEED PROMPTLY WITH CONSTRUCTION PROJECTS IN THE ABSENCE OF FEDERAL GRANTS UNDER THE PROGRAM

There is no realistic prospect of funding all the needs identified in this program. As the present condition of the economy has been years in the making, so must the fiscal restraint necessary to economic revitalization become a discipline of extended duration. It is incumbent on the Congress, therefore, to seek least-cost alternatives or supplementary financing devices if achievement of our clean water objectives is not to be delayed to an unacceptable degree.

5. THE STATUTE SHOULD REQUIRE FEDERAL AND STATE REVIEW OF PLANS AND SPECIFICATIONS ONLY TO THE EXTENT OF "BUILDABILITY AND BIDABILITY," THUS FOCUSING RESPONSIBILITY ON THE GRANTEE COMMUNITY AND ITS DESIGN ENGINEER

Under this scope of review, plans and specifications would be examined only in terms of normal construction standards, rather than evaluation of process design and equipment, and for the completeness and adequacy of the project as the basis for a contractor's bid. This is in recognition of the deficiencies in the existing review process, and the fact that approval implies a shared responsibility by the federal and/or State agency which does not indeed exist. EPA regulations, in fact, contain this disclaimer:

> Review or approval of project plans and specifications by or for EPA is for administrative purposes only and does not relieve the grantee of its responsibility to design, construct, operate and maintain the treatment works described in the grant application and agreement.

This is not to say that the States should be prohibited from conducting such reviews. It is to say that federal law should no longer clutter up the complex relationships between and among those various public and private entities involved in development of a project, making accountability difficult to determine. This recommendation contemplates, rather, greater oversight on the part of the federal agency with respect to State performance and less in the way of project-by-project review.

6. EXISTING FACILITIES PLANNING AND DESIGN WORK (STEPS 1 AND 2) SHOULD REMAIN ELIGIBLE FOR FUNDING

Regardless of the degree to which they are reviewable by federal and State agencies, facilities planning and engineering design steps are critical to the proper construction of wastewater treatment works. The record indicates that plants constructed under procedures prescribed by Public Law 92–500 generally perform better than those constructed under its predecessor, Public Law 84–660. To some extent this is attributable to the fact that Public Law 92–500 plants have been built to higher design standards. But the Subcommittee is also prepared to attribute some of the improvement to the higher caliber of planning and engineering required by the 1972 Act.

7. NO CONSTRUCTION GRANT (STEP 3) SHOULD BE AWARDED TO A COMMUNITY FAILING TO ACHIEVE SUBSTANTIAL COMPLIANCE WITH ITS INTERIM PERMIT REQUIREMENTS FOR ANY EXISTING FACILITIES IT MAY HAVE FOR A PERIOD OF 12 MONTHS PRIOR TO THE AWARD

The purpose of this recommendation is to provide the maximum assurance that the grantee demonstrate the commitment and capability to run the facilities constructed or upgraded with federal funds. This can be done only if the community demonstrates that it is doing the best job possible with the facilities it already has.

By "substantial compliance," the Subcommittee does not mean 100 percent compliance with permit requirements, and would allow the Administrator some discretion in determining whether a plant is, in the main, operating well. Minor noncompliance would not disqualify an applicant. If existing treatment works are incapable of coming close to meeting permit requirements, the appropriate course would be to establish realistic effluent limitations on an interim basis.

8. NO GRANTEE SHOULD RECEIVE MORE THAN 80 PERCENT OF THE TOTAL FEDERAL SHARE OF THE PROJECT COST UNTIL THE PROJECT HAS BEEN IN SERVICE AND IN SUBSTANTIAL COMPLIANCE WITH ITS PERMIT REQUIREMENTS FOR 12 CONSECUTIVE MONTHS

The purpose of this recommendation is to provide the grantee—and those with whom he contracts for professional services, construction and equipment—a substantial stake in the facility's performance capability. The retained portion should be made available to the grantee, but with an obligation that sums be retained in an escrow account pending release. Any interest accruing on the retained portion should be credited to those from whom payment has been partially withheld.

As in the case of the previous recommendation, minor violations of permit requirements should not constitute failure to achieve substantial compliance.

9. THE LAW SHOULD BE AMENDED TO AUTHORIZE, ON THE BASIS OF ACCEPTABLE FACILITIES PLANS, "TURNKEY" DESIGN AND CONSTRUCTION CONTRACTS

The purpose of this recommendation, supported by GAO, some equipment suppliers, and others is to pinpoint responsibility for proper performance of the treatment works by making one party responsible. Following completion of a step 1 facilities plan, the municipality would contract with a consulting engineer, process engineer, equipment manufacturer or general contractor, or another responsible and appropriate party, for design and construction of the project according to the facility plan and capable of meeting its effluent requirements. (This is done now in the case of operations service contracts, and resembles a practice widely applied in Europe.)

10. THE STATES SHOULD BE ENCOURAGED TO ESTABLISH PROGRAMS TO PREQUALIFY CONSULTING ENGINEERS WISHING TO PARTICIPATE IN DESIGN OF FEDERALLY ASSISTED TREATMENT WORKS

This practice, already followed in some States, involves the development of lists of design engineers on the basis of demonstrated capability. It would not necessarily rule out firms without extensive background in the field, but would require them to participate in joint ventures with more experienced consultants. The encouragement would be exerted by EPA in its oversight of the program, including its evaluation of the performance of States exercising delegation under section 205(g) of the Act.

11. THE PROGRAM TO STIMULATE INNOVATIVE AND ALTERNATIVE TECHNOLOGY SHOULD BE CONTINUED ON A PERMANENT BASIS WITH SEVERAL MODIFICATIONS

The mandatory set-aside should be set at the rate of a minimum of 3 percent and a maximum of 5 percent at a State's option. Further, the law should be modified to allow components, or unit processes, to be eligible for the bonus grant as opposed to the current requirement of realizing cost or energy savings over the costs of the entire plant. This approach, by reflecting the fact that improvements in technology are often incremental in nature, should encourage greater use of innovative techniques.

Finally, a national program for selecting and constructing innovative projects, outside of the existing program, should be established. An additional one percent of total grant funds available annually should be set aside in a national pool to fund the program, to be administered by EPA, to provide 85 percent incentive grants for innovative projects reviewed and approved by a panel of independent experts. (At the State level, California has established such a panel for I&A project review.) This approach should provide further incentive for process design engineers and equipment manufacturers to develop more innovative technologies by eliminating most of the inherent redtape and institutional biases that have worked to discourage the use of such technologies in the past.

12. THE LAW SHOULD BE AMENDED TO PROVIDE THAT, IN THE CASE OF INNOVATIVE AND ALTERNATIVE TECHNOLOGY, FIELD TESTING ON WHATEVER SCALE IS NECESSARY TO ELIMINATE UNACCEPTABLE RISK BE ELIGIBLE UNDER STEP 1 (FACILITY PLANNING) AND STEP 2 (DESIGN ENGINEERING)

The purpose of this recommendation is to provide further incentives to innovation, helping to overcome persistent resistance to change on the part of municipalities and their consulting engineers. Filling the gap between laboratory simulation and small-scale field testing, at one end of the process, and full-scale application, at the other, this would provide a critically needed element of verification with respect to the performance capability of a process or component.

The bulk of the field testing would most likely occur in the case of innovative and alternative projects. However, this recommendation would also apply to projects receiving conventional funding, provided that the component or process involved were truly innovative and in need of such testing to win acceptance.

It is further the intent of this recommendation to allow small communities, and others lacking the capability to perform such field testing in connection with their own facilities, to contract with larger metropolitan agencies ready and willing to do the job.

13. THE REQUIREMENT CURRENTLY IN THE ACT THAT BIDS SPECIFY TWO BRAND NAMES "OR EQUAL" SHOULD BE MODIFIED TO SPECIFY ONLY ONE BRAND NAME "OR EQUAL"

Found in no other federal assistance program to the Subcommittee's knowledge, this provision has complicated the procurement process in several respects. It leads to costly and time-consuming bid delays. But beyond that, it stifles incentive for equipment manufacturers to invest in genuinely unique innovations with any realistic hope of marketing them. It also dilutes responsibility and accountability for the performance of the plant designed by the consulting engineer. Its removal thus should improve the operation of the program in the case both of innovative and alternative technology, and projects financed in the conventional manner.

14. IN THE CASE OF INNOVATIVE PROJECTS, EPA SHOULD ADMINISTRATIVELY MODIFY ITS CURRENT PROCEDURES TO ENCOURAGE THE USE OF SOLE SOURCE PROCUREMENT

While sole-source procurement is permitted by the statute, it has been administered in such a manner as to limit its use. This has proved a deterrent to engineers seeking to go this route as the most feasible way of introducing a technology. Even if the provision requiring specification of two brands or equal is modified along the lines of the previous recommendation, there will remain a need for sole-source procurement.

15. THE ENVIRONMENTAL PROTECTION AGENCY AND STATES MANAGING THE DISCHARGE PERMIT PROGRAM SHOULD STEP UP THEIR ENFORCEMENT ACTIVITIES AGAINST POORLY PERFORMING COMMUNITIES

The record leaves no doubt that, in the past, EPA has concentrated its enforcement efforts against industry rather than municipalities. EPA should redress this imbalance and insist that munipalities obey the law. This should not be done punitively, however, but rather with the objective of achieving compliance with the requirements of the Clean Water Act. Rather than rely heavily on fines, for example, the enforcement effort should make greater use of the "composite correction program" (CCP) whereby communities are required to: (a) obtain the services of operations consultants to

diagnose their problems, and (b) carry out the resulting recommendation at their own expense (except in the limited number of cases in which there are grounds justifying "fix-up" grants).

16. STATES WHICH CONTRIBUTED SOME PORTION OF THE NON-FEDERAL SHARE OR PROJECT COSTS SHOULD USE STATE FUNDS AS LEVERAGE TO PERSUADE GRANTEES TO PERFORM GOOD OPERATION AND MAINTENANCE

New Hampshire, for example, contributes 20 percent of project cost, the applicant communities the remaining five. However, the locality is required to bond itself for the entire 25 percent of the non-federal cost of the project, and is reimbursed by the State in the form of assistance in paying off bond interest and principal when due. The State has been successful in withholding, or threatening to withhold, reimbursement as a means of improving grantee performance on completed projects.

17. THE EPA SHOULD MAKE USE OF THE EXISTING AUTHORITIES IN TITLE I OF THE ACT AUTHORIZING PILOT AND DEMONSTRATION PROGRAMS FOR THE TRAINING OF TREATMENT PLANT OPERATIONS AND MAINTENANCE PERSONNEL, AND OTHER PROGRAMS FOR ENSURING THAT THERE IS AN ADEQUATE SUPPLY OF ADEQUATELY EDUCATED AND TRAINED INDIVIDUALS FOR DESIGNING AND OPERATING WASTEWATER TREATMENT WORKS

The record of evidence before the Subcommittee indicates that the costs of operating and maintaining a treatment works in the substantial majority of cases is very affordable. However, individual communities can not be expected to underwrite the total costs of training trainers, or those that are involved in the design and subsequent management of many of today's more modern facilities.

Given the federal role in expanding this need, there is an incumbent responsibility on the federal government to share in the costs of schools, and other educational institutions and/or vehicles for ensuring an adequate supply of properly trained and educated personnel for the design, and operation and management of treatment works. Similarly, the policies of the EPA for reviewing and approving State applications for grants assistance under the clean water law should similarly reflect the importance of treatment plant operator training and technical assistance programs.

18. PROJECTS TO CORRECT EXCESSIVE INFILTRATION AND INFLOW SHOULD REMAIN ELIGIBLE FOR FUNDING IN CASES WHERE THEY CAN BE DEMONSTRATED TO BE COST-EFFECTIVE ALTERNATIVES TO TREATMENT PLANT CONSTRUCTION

The extent of the I&I problem, coupled with advancements in technology for detection and diagnosis, make it essential that States annual allotments be available for this purpose. In the absence of I&I correction, treatment plant operational effectiveness will be reduced, and localities will be forced to increase the size of their treatment works to handle excessive flows.

19. THE LAW SHOULD BE AMENDED TO ALLOW A RANGE OF EFFLUENT LIMITATIONS APPLICABLE TO MUNICIPAL TREATMENT WORKS RATHER THAN A SINGLE, RIGID SET OF NUMBERS APPLICABLE ON A NATIONWIDE BASIS

It would be constructive to permit a range of effluent limitations which permit the use, where appropriate, of such forms of treatment as trickling filters, lagoons and ponds. Consideration should be given to basing the determination of appropriate secondary municipal technology on the general charateristics of the receiving stream, the nature of the wastes involved and the affordability of various secondary treatment processes available to the community. As to receiving waters, it should not be necessary to make precise determinations of wasteload allocations as done (with great imprecision) in the establishment of water quality based effluent standards. Instead, it should suffice to categorize generally the volume and rate of flow of the water body, and nature and sensitivity of the aquatic life inhabiting it. In other words, it should not take a 10-year study and endless computer runs to distinguish between a fishing stream and the Lower Mississippi River. There is a large range of both conventional and alternative technology available providing levels of treatment between primary and secondary for this purpose.

20. THE PROVISIONS OF EXISTING LAW (SECTION 301(h)) WITH RESPECT TO THE GRANTING OF WAIVERS FROM SECONDARY TREATMENT REQUIREMENTS TO COASTAL COMMUNITIES DISCHARGING INTO MARINE WATERS THROUGH OCEAN OUTFALLS SHOULD BE MODIFIED TO EXPAND THEIR AVAILABILITY TO ADDITIONAL APPLICANTS

Section 301(h) was enacted in 1977 to avoid treatment for treatment's sake, in recognition of the fact that ocean waters are less sensitive to some pollutants than fresh waters. It is the Subcommittee's view that the provision was too narrowly drafted, limiting waivers to applicants with ocean discharges at the time the 1977 Act was passed. If there was economic and environmental merit in granting waivers to existing ocean dischargers, the same should have been true in the case of municipalities contemplating the need for costly construction, expansion or upgrading of secondary treatment facilities. And if it made sense in 1977 when annual authorizations were in the $5 billion range, an even more compelling case can be made today with prospects of roughly half that amount.

Moreover, several municipalities were discouraged from applying by the tight deadline—270 days—in the statute by which time applicants had to submit applications. This in combination with requirements for submission of extensive data on environmental impact represented a formidable task that dissuaded many communities from applying. The application process should be reopened, therefore, without any such unrealistic constraint.

The law also should be amended to make clear the intent of Congress—as interpreted in one federal circuit—that communities with existing secondary treatment may apply for waivers. Far from permitting "backsliding," this amendment would allow such communities to avoid excessive operation costs, and in some cases the need for

additional capital investment in treatment facilities to continue meeting secondary requirements.

Finally, the Congress should give greater attention to the eligibility criteria in existing section 301(h), to determine whether they are focused too narrowly on the marine environment as to exclude such considerations as threat to air and groundwater resulting from disposal of the increasing amounts of sludge resulting from the secondary treatment process, as well as economic implications. While the record at this point would not sustain a legislative amendment toward this end, there are grounds for a great deal of further consideration by the Congress as more information is generated in this field.

21. THE LAW SHOULD BE AMENDED TO PROVIDE THAT ONE-QUARTER OF ONE PERCENT OF THE ANNUAL AUTHORIZATION FOR THE CONSTRUCTION GRANTS PROGRAM BE AUTOMATICALLY COMMITTED TO THE OFFICE OF THE INSPECTOR GENERAL FOR THE PURPOSE OF INVESTIGATIONS AND AUDITS LIMITED EXCLUSIVELY TO PROJECTS FUNDED UNDER THE PROGRAM

The Environmental Protection Agency remains the agency ultimately responsible for the use of federal funds under this program. True, a great deal of the program's routine operations have been delegated to some of the States, and considerably more delegation can and should take place. But the purpose of delegation has never been to have EPA abdicate its responsibility, but rather to have the States take over management of the program and expand the oversight role of the federal agency. That means investigations, monitoring and audits, and they take resources. That is a need today and that need will increase as States phase more fully into delegated status. Therefore, the Subcommittee recommends this set-aside for the IG function and emphasizes that any funds thus provided be in addition to, not in substitution for, any funds now provided to the Office of Inspector General.

22. STATE DELEGATION SHOULD BE FUNDED BY A SET-ASIDE OF UP TO 4 PERCENT OF EACH DELEGATED STATE'S ANNUAL AUTHORIZATION RATHER THAN THE 2 PERCENT PROVIDED IN EXISTING LAW

Stability, continuity and predictability have been problems in the State delegation program since its inception, largely because of fluctuations in annual appropriations. The likelihood that authorizations and appropriations will be held at even lower levels in the foreseeable future makes this amendment essential. In addition, the Subcommittee recommends that States make greater use of State management assistance funds provided under section 205(g) for inspection and audit of construction projects.

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